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and
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The Outlook

Per Mare ad Astra

TWO recent events have served to turn the eyes of the aeronautical world seawards: the launch of the last of the 21 Hythe-class Short flying boats for B.O.A.C., and the announced details of the Saunders-Roe SR/A1 twin-jet single-seater fighter.

In the civil field there was, for a considerable time, great uncertainty about the flying boat. Official Government pronouncements on policy were vague and unsatisfactory, and the Corporation itself appeared inclined merely to watch technical developments, seemingly forgetting that unless it did something rather more active than that, there would be no technical development. Happily, those concerned ultimately "saw the light," and the 21 Hythe-class boats are to be followed by other types, including the very large Saunders-Roe boat now being developed. On Empire air routes there is much to be said for the use of the flying boat, and the way this class of aircraft has, in the past, operated almost without terminal facilities, is proof of its versatility. It must not be asked to operate regularly under such a handicap in future, but its past history shows that it can find alternative bases much more readily than can the landplane when diverted by fog or other obstacles from its regular destination.

In the military field the flying boat has suffered from the disadvantage that in small sizes the flying boat with piston-driven airscrews could not be made aerodynamically efficient. Jet propulsion has introduced a new factor in flying-boat design; there is no airscrew clearance to introduce undesirable features, and the use of two jet units close together makes good single-engine performance possible. These facts have been fully exploited in the design of the new Saunders-Roe fighter described in this issue.

From the operational point of view, the flying-boat fighter with landplane fighter performance should score on many points. It does not need the advance preparations (landing strips, etc.) which the landplane fighter requires before it can operate from an advanced base. Almost any strip of sheltered water will suffice. In many cases it will be able to operate from a point much closer to the target than would be possible for the landplane fighter, unless that was carrier-borne. This fact will to some extent make up for the greater fuel consumption of the jet-propelled flying boat. Its base can be camouflaged fairly easily, and its "runways" cannot be made unusable by enemy action, unless it be by dropping a lot of logs in the water around the base. Even in the latter case, it would not take any longer to sweep the stretch of water than to repair a runway.

The Saro SR/A1 will be the world's fastest flying boat, and not only its technical development but its operational applications will be watched with the greatest interest.

University Air Squadrons

THE announcement of an entirely new scheme for University Air Squadrons is most welcome news. Now, as in the years before the war, there could be no better source of the type of young men needed in the R.A.F. than the Universities.

Under the new scheme, some details of which appear on page 498, there will be a considerable extension of the pre-war scope as far as commitment, work, and the number of squadrons formed are concerned. Whereas in the past the staff—a small nucleus of serving officers—formed the sole link between the Service and what was virtually a flying club, the new squadrons will have the tremendous advantage of counting among their members a good proportion of seasoned young R.A.F. pilots. New recruits, profiting by the experience of their fellows, will quickly learn Service ways and customs and will, in fact, get the "gen" on every subject likely to help them while in the Squadron and afterwards as regular Air Force officers.

There are fundamental differences in this new scheme which will bring the eleven University squadrons up to the status of a non-regular second-line force. In particular, there is the granting of limited Service commissions up to the rank of Flight Lieutenant to ex-R.A.F. pilots, the granting to flying members of a £35 annual retainer, and a five years engagement extending into a form of reserve Service after coming down from the University.

As in pre-war days, members of the squadron will be eligible for consideration for direct entry commissions into the regular Air Force. In the squadrons the rank of new University members will be Cadet Pilot and their status that of Officer Cadet. Ex-R.A.F. Officer or Airmen pilots will be commissioned P/O, F/O or Flight Lieutenant.

Details are as yet incompletely announced, but the success of these new squadrons as a source of Regular Air Force officers will depend to a great extent on efficient organization and attention to details. The difficulties and drawbacks which can result from a mass-production of commissioned aircrew who, however, lack even an elementary knowledge of administration or the responsibilities of their rank, were brought out in wartime.

It is to be hoped that there has been a modification of the pre-war scheme for teaching the new officer cadet to fly in once-weekly term-time lessons of about 45 minutes duration (weather permitting) and of forbidding a first solo flight except at summer camp. Initial flying instruction up to a total of some 20 hours dual and solo flying, should be given in frequent regular short lessons extending over a period of not more than four weeks. Obviously the University curriculum must not be upset unduly, but means should be sought to instruct pupils in an efficient manner.

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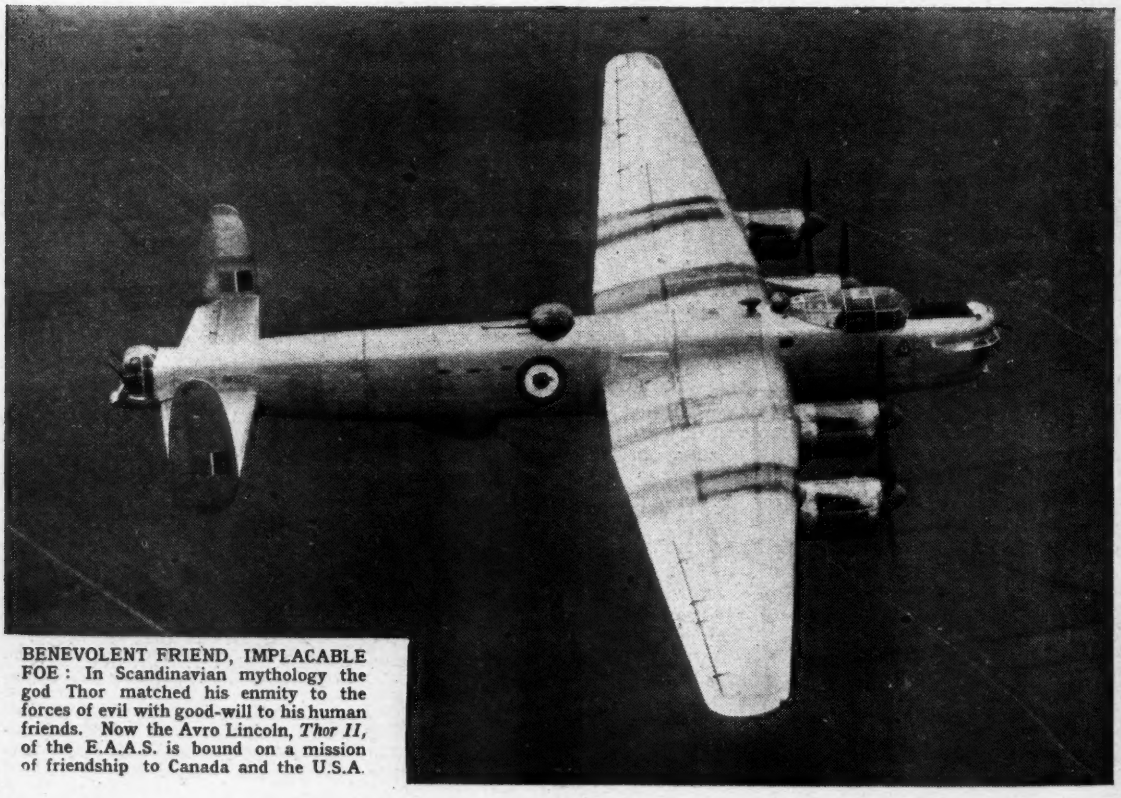
Minimum flying requirements for members of the squadrons are laid down as 20 hours a year in term time. Even for the fairly experienced pilot, it is doubtful whether such a small total is worth while or even advisable from the safety point of view, if modern Service aircraft are to be used. If light trainers are to be the sole equipment, it is doubtful whether the hours are of much value anyway; as witness, the 3,500 hour ex-Coastal Command applicant to a British airline who was told recently that his 1,500 hours as an elementary instructor were "irrelevant."

Following yesterday's announcement regarding conditions of auxiliary Service, and when similar information is available regarding the Volunteer Reserve, it may be possible to assess the true value of these schemes and to estimate the probable appeal to the type of young man required to stand behind our regular Air Force.



BENEVOLENT FRIEND, IMPLACABLE FOE: In Scandinavian mythology the god Thor matched his enmity to the forces of evil with good-will to his human friends. Now the Avro Lincoln, *Thor II*, of the E.A.A.S. is bound on a mission of friendship to Canada and the U.S.A.

Air Armament Mission

"Thor II" is Prepared at Manby : Work of the Empire Air Armament School

"WITHOUT armament," said Lord Trenchard, "there is no need for an air force." That this axiom is fully accepted by the Air Staff can hardly be questioned after having visited the Empire Air Armament School at Manby in Lincolnshire, as *Flight* did last Thursday with the dual object of seeing the Avro Lincoln *Thor II* before her mission to Canada and the U.S.A. (referred to in the issue of October 24th), and of learning something of the work of the School.

The E.A.A.S., and the Central Gunnery School at Leconfield, are under the ægis of Air Vice-Marshal G. Combe, C.B., Director-General of Armament, who flew up to Manby last Thursday to join *Thor II* for the trans-atlantic journey. He was welcomed by Air Cdre. H. D. Spreckley, O.B.E., the Commandant, and met the crew, whose names and duties follow :

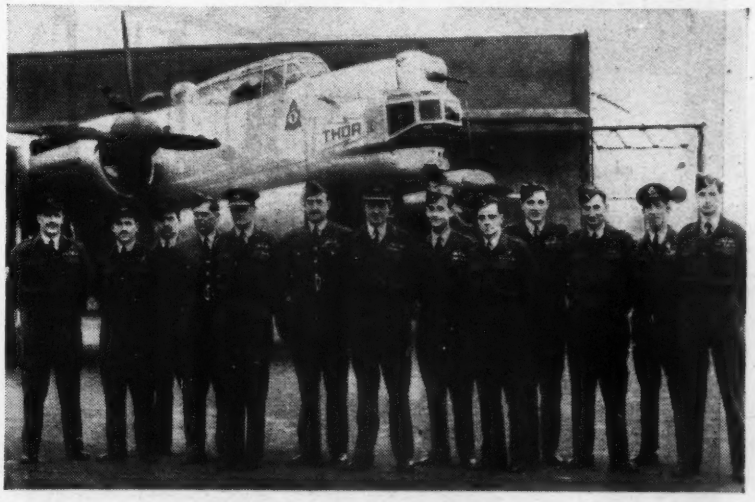
Group Capt. R. H. E. Emson, C.B.E., A.F.C. (Leader of the Air Armament Mission); Wing Cdr. M. H. de L. Everest (O.C. Flying at Manby and Captain of *Thor II*); Sqn. Ldr. B. R. Murphy (Pilot Attack Instructor); Flt. Lt. R. W. Fleming (Navigator); Flt. Lt. B. C. Fitch, D.F.C. (Second Pilot); Flt. Lt. R. A. Denny, D.F.C. (Flight Engineer); Flt. Lt. G. W. Milburn (Gunnery Leader); Flt. Lt. F. E. Murphy (Radar Officer); Flt. Lt. D. F. Shallow (Electrical and Instrument Officer); F/O. R. F. Cartwright (Wireless Operator); and F/O. D. J. White (Bombing Leader). Wing Cdr. Everest will be remembered as the Captain of *Thor I*.

The Lincoln reflects (almost literally, for she is without camouflage) all the smartness and efficiency for which Manby is noted throughout th Service. She is a standard Mk. II machine but is powered with Rolls-Royce Merlin 68A "winterized" power plants. Old-style red, white and blue roundels, blue "accessories," including H2S scanner fairing, and the crests of the E.A.A.S. and C.G.S. enhance appearance. The standard Lincoln armament is mounted, comprising a remotely controlled Boulton-Paul Type F turret with two 0.5in Brownings, a Bristol B.17 Mark III mid-upper turret with two 20mm British Hispanos, and, in the tail, a Boulton-Paul Type D turret with two 0.5in Brownings. This rear turret has the radar blind-firing device known as "AGL" (automatic gun laying). Navigational equipment includes the latest mark of H2S, Rebecca Mk II, Loran, Gee Mk. II, radio compass, G.P.I. and A.P.I. The automatic pilot is a Mark VIII.

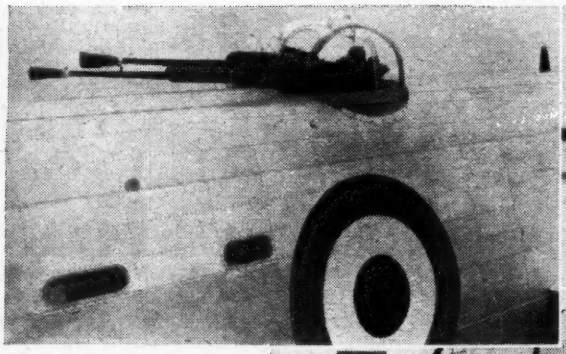
New Equipment

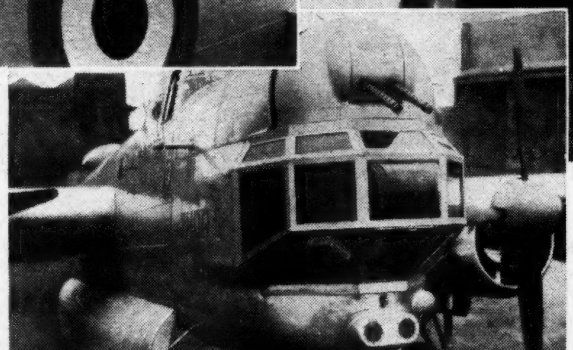
Thor II has not long been delivered to the E.A.A.S., and the Commandant had a particular word of praise for the ground crew, including two W.A.A.F.s, who have prepared her. She replaces the Lancaster *Thor I*, which, after having spread the doctrines of the E.A.A.S. throughout the Empire, is now working-out her time at Manby as an instructional aircraft.

On one of the last air-tests of *Thor II* we were able to operate the mid-upper and tail turrets and to use a Martinet as an aiming mark for the gyro gun sights. New-



Air Vice-Marshal G. Combe, C.B., Director-General of Armament (fifth from left) with Air Cdre. H. D. Spreckley, O.B.E., Commandant, E.A.A.S., and the crew of Thor II. On the Air Vice-Marshal's right is Wing Cdr. M. H. de L. Everest, and on the Commandant's left Group Capt. R. H. E. Emson, C.B.E., A.F.C.





THOR'S TURRETS: Topleft, the Bristol B.17 Mk III (mid-upper); right, the Boulton-Paul Type D (tail), with the Gunnery Leader checking a muzzle cap; and, below, the Boulton-Paul Type F (tail).

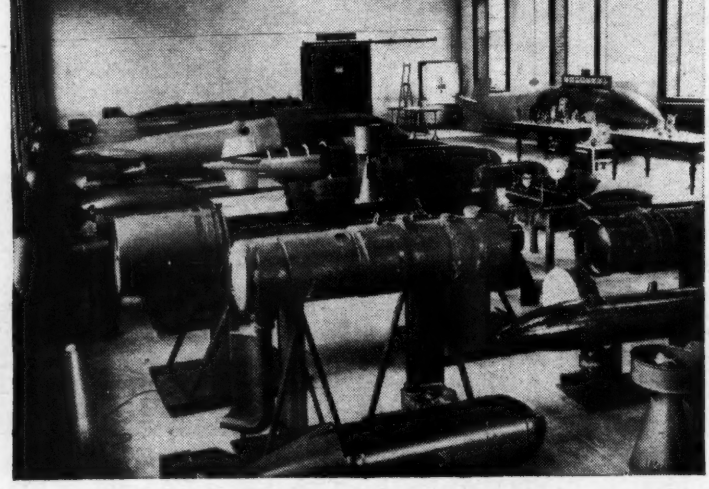
AIR ARMAMENT MISSION

World armament technicians will find plenty to interest them on seating themselves in these modern turrets. During the same flight Wing Cdr. Everest did a farewell "beat-up" of Leconfield, home station of the Pilot Attack Instructor and Gunnery Leader.

No detailed analysis of the work undertaken at Manby is possible here. Briefly, the Instructional Wing houses the "A Star" Course (this trains officers for work in experimental establishments, posts in the Ministry of Supply, etc., and lasts two years); the Specialist Armament Officers' Course (27 weeks), Armament Officers' Refresher Course (8 weeks); and Bombing Instructors' Course (10 weeks). The Empire Armament Staff Course is held in another wing, and lasts 14 weeks.

In the Turret Room specimens of all current types of power turrets used on British aircraft are mounted for operation and study. "Bomb Alley" is a large room (only a portion is shown in our photograph) housing every type of bomb, photo-flash, ground marker and incendiary container and cluster, with the 22,000-lb "Grand Slam" ruling the roost. Fuses are sectioned and beautifully presented in illuminated cases. From the standpoint of display, the ammunition room makes the finest show; here are cases and racks of projectiles from small-arms ammunition to Triplex R.P.s with 3-inch rocket motors, 180-lb warheads, and weighing 380 lb all-up.

It is evident in the Foreign Equipment Room that the School sets out not only to instruct but to interest, for it can no longer be claimed that rifles and pistols are "Air Armament," nor is it likely that air-crew would under any circumstances be obliged to wield swords and trench-knives. Of the German exhibits the He177 tail turret, with four 13mm guns, and the 30mm MK108 are particularly striking—the former for its mass and the latter for its amazing compactness.



A section of "Bomb Alley" with the 22,000 lb. "Grand Slam" in the background. Bombs are sectioned on the Station.

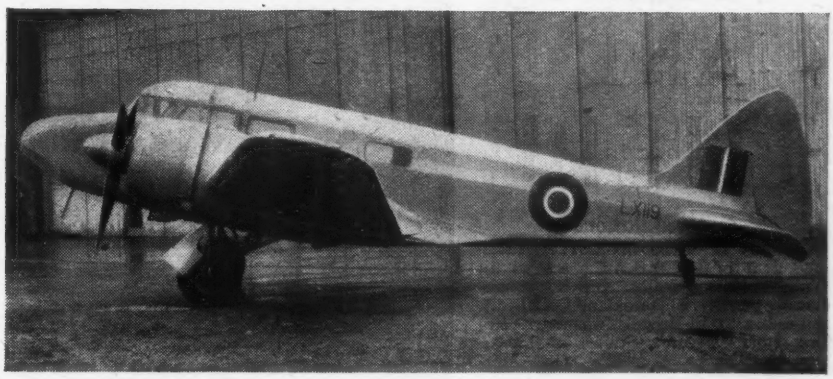
Bomb sights include the standard Mark XIV, the S.A.B.S. (Stabilized Automatic Bomb Sight), and a special type of low-level sight for coastal Command use. In the Gun Demonstration room a 0.5in Browning gun is shown working in section at a much reduced rate of fire. Every phase of feeding, loading and ejection is apparent.

Finally, the library, examination rooms, laboratories and cinema would do credit to any scientific institute.

As these pages close for press it was learned that *Thor II* was to take-off from St. Mawgan on November 5th *en route* for the Azores. Thence her itinerary is Gander, Dartmouth (Nova Scotia), Ottawa (here D.G.A. will leave to deliver a paper on Air Armament Training and Development), Toronto, Winnipeg, Edmonton and Vancouver. In the U.S.A. visits will be paid to Inyokern (California), Smoky Hill (Kansas), Maxwell Field, Wright Field, Patuxent River and Washington, D.C.

Leonides Air Tests

Alvis Engines Complete 50 Hours' Flying in an Airspeed Oxford



The 515 h.p. Leonides engines, far from appearing oversized, tend to enhance the appearance of the Oxford.

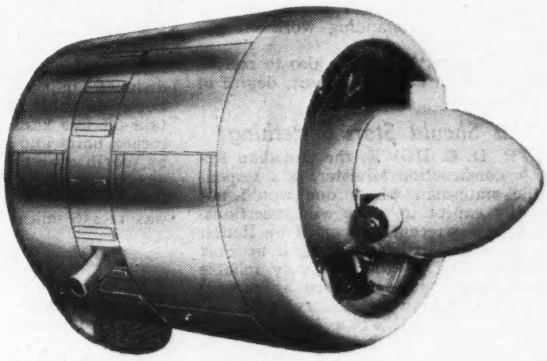
IN the years immediately before the war the Alvis Company had a number of large radial engines under development, the original designs being basically Gnome-Rhône. When war broke out a new smaller engine was also on the way, known as the Leonides. In the 500 h.p. class, this unit had passed initial tests and seemed to fill a gap in the piston-engine range. National emergency required that Alvis resources be employed on other aircraft engine work, so although the company gained additional experience in this field, their small engine had to be shelved in its adolescence.

Released from war contracts, Alvis, Ltd., have just started small-scale production of the latest Leonides, following successful completion of the full military type-test and more than fifty hours' test flying with two units installed in an Airspeed Oxford.

The Leonides is a nine-cylinder radial, giving a maximum output of 515 h.p. at 4,000ft and having an international rating of 425 h.p. at 9,000ft. Its overall diameter of 42in is extremely small for its power output, and its maximum power/weight ratio of 1.44 lb/b.h.p. is also very good for a well-equipped self-contained unit. The weak-mixture fuel consumption is 0.49 pt/b.h.p./hr.

Among the salient features is the Hobson automatic fuel injection system with an induction system incorporating air-cleaning and de-icing facilities. The rigid construction of the built-up crankshaft with splined sleeve, and the plain white-metal big-end bearing, are also noteworthy.

Recently *Flight's* representative examined the components of the two Leonides which were installed in the Oxford, and found all to be in good condition. No components needed to be replaced, and the units may be said to have stripped very well. They have completed 77 and 79 hours respectively, of which 53 were run in the air. After reassembly the same two units will run on to 100 hours, when a minor inspection will be made. The aim is to obtain approval for a 500-hour overhaul period, and it would seem that this figure is by no means beyond the capacity of the engines. The air test recently completed represented, in effect, half the A.R.B. flight-test requirements.

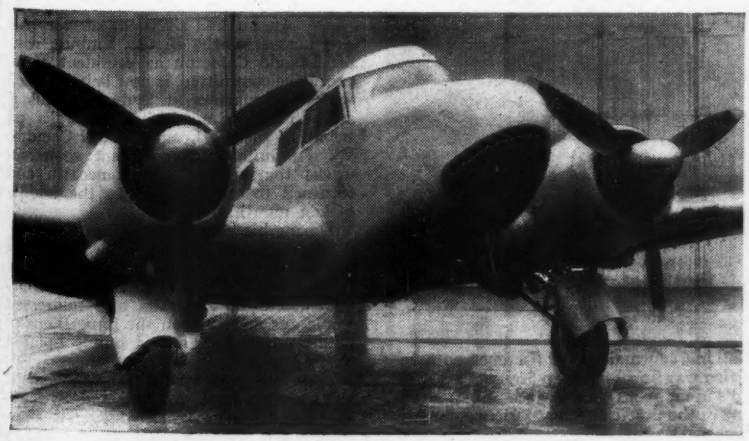


Now in small-scale production for the Concordia, the Leonides Le.I.M is supplied as a self-contained unit. Note the latest position for the air intake and exhaust pipes.

The power eggs fitted to the Oxford differ superficially from the Le.I.Ms being built for the Cunliffe Owen Concordia. "Lash-up" engine mountings were prepared to avoid changing the Cheetah pick-up points, and the original two-lever control and 12-volt electrical systems were retained.

With so much additional power the Oxford has an almost startling climb, and the maximum level speed is said to be about 250 m.p.h. Under engine-off conditions some tail buffeting is experienced. This can be cured by the use of 5-10 deg of flap or modification of the baffles to allow some spill.

In all, more than 4,000 hours' running time has been completed by Leonides engines, several individual units having now done over 500 hours.



Neat cowling and gil treatment, together with a diameter of only 41.5in, make the Leonides the most compact unit in its class.

HERE AND THERE

Congratulations

MR. W. R. VERDON-SMITH, President of the S.B.A.C., son of Sir William Verdon-Smith, C.B.E. (Chairman of the Bristol Aeroplane Co., Ltd.), and a director of Bristols, was married to Miss Jane Margaret Hobbs, at Thornbury, in Gloucester, on Nov. 1st.

Whittle to be Honoured in U.S.A.

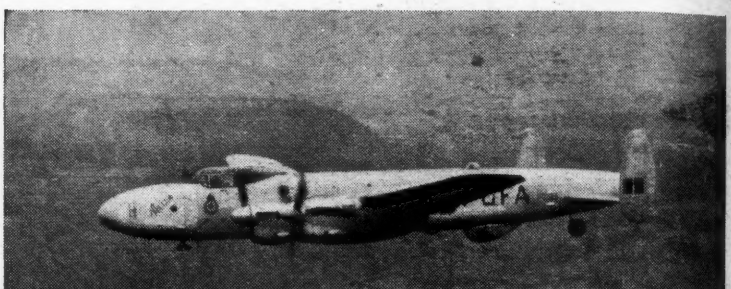
YESTERDAY (Wednesday) Air Comdre. Frank Whittle left for New York aboard the Queen Elizabeth. He is due to attend the annual dinner of the American Society of Mechanical Engineers, on which occasion the Guggenheim Medal will be presented to him for his outstanding work on gas turbines.

Air Comdre. Whittle is also to receive the American Legion of Merit, degree of Commander.

This Should Start Something!

MR. D. C. HOWE, the Canadian Reconstruction Minister, is a responsible statesman whom one would not readily expect to make wild assertions. Yet he was recently reported by Reuter to have declared, in a speech at Fort William (Ont.) "that the only reliable transatlantic airline service at present was the Canadian T.C.A. service."

Before B.O.A.C., Pan American Airways, K.L.M., A.O.A., etc., arise in their indignant wrath to tear Mr. Howe apart, let us hasten to suggest that he may possibly have been slightly misreported, or even incompletely reported.



OFF AGAIN: The famous Avro Lancaster, *Aries*, of the Empire Air Navigation School snapped just before leaving Shawbury recently for Canada and the U.S.A.

Feet, Not Yards

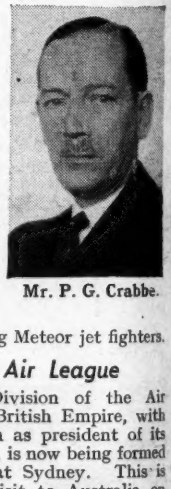
A NOTE from Cdr. T. D. Davies, U.S. Navy, asks us to emphasize the fact that the take-off of the Lockheed *Truculent Turtle* for its recent record long-distance flight was made in 4,700ft and not 4,700 yards as has been stated. The take-off was assisted by three J.A.T.O. rocket units and the all-up weight was 27,500 lb over the normal gross load of 58,000 lb. The distance flown from Perth, Australia, to Columbus, Ohio, was 11,236 miles.

Death of Brig.-Gen. Gross

FROM America it is reported that Brigadier-General Mervin E. Cross was killed recently during a flight in a P-80 jet plane near Brooksville, Kentucky. Apparently he was on his way from an Air Force base in the south to Wright Field. During the war Brigadier-General Cross served as chief of the Requirements Division, A.A.F. Headquarters, Washington. He was one of the closest collaborators between the British and American Air Forces from the beginning of the war, and made many friends among the British, who will mourn his loss very sincerely.

On the Board

MR. P. G. Crabbe, who succeeded Mr. Francis McKenna as general manager of Gloster Aircraft Co., Ltd., has now been appointed a director of the concern. As assistant - general manager of Armstrong Whitworth, another of the Hawker - Siddeley Group companies, Mr. Crabbe took a large share in the mass production of the Whitley, Lancaster, and finally, the Avro Lincoln. Glosters are now, of course, busily engaged in producing Meteor jet fighters.



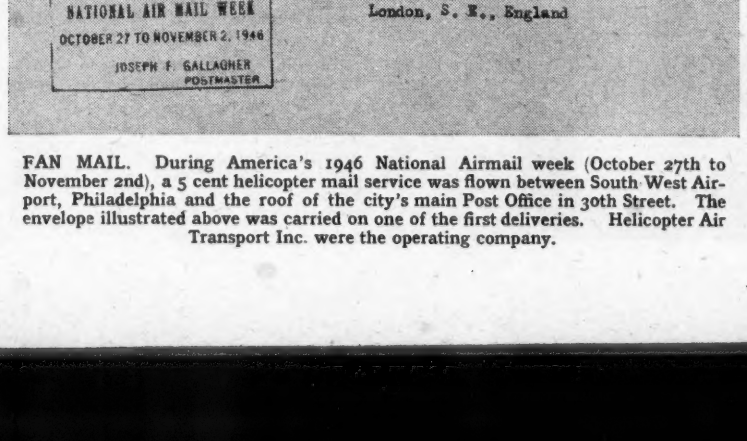
Mr. P. G. Crabbe.

Australian Air League

AN Australian Division of the Air League of the British Empire, with Sir Donald Cameron as president of its executive committee, is now being formed with headquarters at Sydney. This is an outcome of a visit to Australia on behalf of the Air League by Air Comdre. W. J. Guilfoyle, who spent some six weeks touring the Commonwealth and returned to this country in the middle of last month.

During his visit, Air Comdre. Guilfoyle discussed with many distinguished Australians the desirability of adapting the Air League's work to the special circumstances of Australia and addressed numerous meetings on the importance of maintaining an informed public opinion on flying affairs.

Committees to forward the movement were set up in Melbourne and Sydney, and the committee in Sydney has since undertaken to establish an Australian



FAN MAIL. During America's 1946 National Airmail week (October 27th to November 2nd), a 5 cent helicopter mail service was flown between South West Airport, Philadelphia and the roof of the city's main Post Office in 30th Street. The envelope illustrated above was carried on one of the first deliveries. Helicopter Air Transport Inc. were the operating company.

HERE AND THERE

Division of the League to serve as a Federal centre for branches to be formed in the various States.

Not So "Daft"

WHEN 72-year-old Mrs. Norah Callaghan, of Glasgow, announced that she proposed to fly to Australia to see her sister in Melbourne, friends and family tried to dissuade her.

But she went.

Moreover she went by way of Paris, New York, and Vancouver, and arrived in Sydney recently, having thoroughly enjoyed her 15,000-mile flight.

"They said I was 'daft' to think of flying to Australia alone at my age," she said on arrival, "but I had a wonderful trip and wasn't a bit air sick."

Good for you, Granny!

tributed by George Philip and Son. Meanwhile, by way of a contrast in activities, Mr. Chichester himself, astronomical tables and all, is attending the P.I.C.A.O. Conference as a delegate.

Hot News

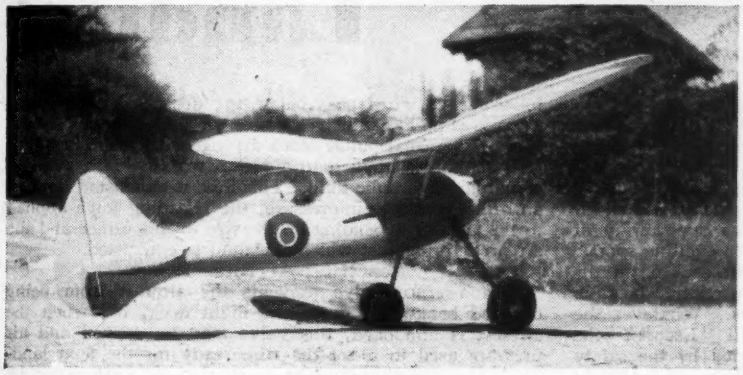
THE way these Fleet Street sleuths get hold of red-hot news items with which to stagger their breathless readers has always aroused our envious admiration.

Consider, for example, that recent story about the three Austers ("Baby" planes, of course) which left Lympne for Southern Rhodesia. Now by itself, there is nothing frightfully startling about that; the makers, in fact, will assure you that it is quite usual for an Auster to fly any old distance provided you keep feeding it with petrol and oil—they make them that way.

But trust the bright boys of the "dailies" to spot the *real* news in this otherwise almost humdrum happening.

Remembering the Northcliffian dictum about men and dogs biting each other, one sleuth (evidently brighter than the rest) at once spotted, and duly recorded, that *"the three pilots were in lounge suits; two of them wore trilbys."*

Why they did not set forth on their 7,000 mile trip in the conventional bathing trunks and straw boater will probably never be known!



DAINTY "DIESEL": This elegant flying model parasol monoplane designed and built by Mr. Derek Dent (ex-R.A.F.) has a span of 42in and an all-up weight of 1 lb 2 oz. The power unit is a Frog "100" compression-ignition engine of 1 c.c.

Playtime

AMONGST the variegated and even surprising activities of Mr. Francis Chichester is that of producing games with an aeronautical flavour. Among these are jig-saw puzzles with almost serious possibilities—since each one is made up from an aviation map-section. Those who fly and know their England will find them instructive as well as amusing, and those who don't do either will still find them very entertaining. The sections used with the new series of puzzles have been specially designed and printed for the purpose, and are an improvement even on those of the original series for which five-hundred-thousand ex-Service maps were employed. The puzzles—at 2s 9d plus tax—are dis-

AIRSTRIP . . . . No. 38

Brisk Business

ORDERS are "pouring in" from all over the U.S., particularly from farmers, for light aircraft to be used for business and pleasure, according to the Aircraft Industries Association in Washington.

At the end of August, continues the statement, there were orders for 48,155 private aircraft waiting to be fulfilled.

STRIKING EFFECT: The nose of an Australian Skymaster after flying through a violent hailstorm It must have been noisy inside!

News in Brief

THE appointment of "safety inspectors" to ensure all possible precautions against accidents was announced last week by *Air France*.

* * *

Avro XIX aircraft (civil development of the faithful Anson) have now been supplied to Ethiopia, Iraq, Egypt, and Eire, and for the use of all British Air Attachés abroad.

* * *

The 10,000th passenger to travel on Channel Islands Airways' Wayfarer was recently given a free passage home from Jersey and, on arrival at Northolt, was presented by a "Bristol" representative with a plastic cigarette-box containing 100 cigarettes.

* * *

The I.A.T.A. general meeting in Cairo, attended by 250 representatives and thought to be the biggest gathering of airline operators ever held, went into closed session on Wednesday of last week to consider the 25-page report of the Association's director-general, Sir William Hildred.

* * *

A new exhaust muffler for light aircraft engines has been introduced by the Ryan Aircraft Company, of San Diego, Calif., who claim that it eliminates 90 per cent of the exhaust noise. They add, however, that much remains to be done to quieten the airscrew, which (as we all knew) contributes a great deal to the noise factor.

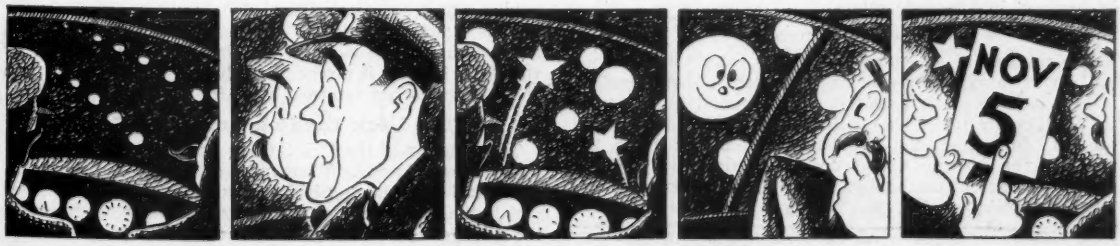


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Fig 2. H.M.S. *Ravager* landing-on an Avenger. This picture should be compared with the deck layout shown in the diagram below.

Special Conditions Demand Different Technique from that of Land Operation

By JAMES BRIDGE
(Ex Lieut. (A) R.N.V.R.)

Deck Landing

LITTLE information has been published on the method of operation of aircraft from the flight deck of a carrier, and the gentle art of deck landing remains a closed book to all but the "favoured" few. Since no carrier is likely to stage a "Hendon" or "Farnborough," grandstand and enclosure space being strictly limited, it is unlikely that many will ever have the opportunity of watching this always fascinating and often exciting sport.*

Fig. 1 gives an idea of the layout of the deck of an aircraft carrier of the Escort class, and the relative position of its various essential component parts. Whatever the type of carrier—large "Fleet" or small "Escort"—the deck falls naturally into two parts divided by the safety barriers. The landing area is roughly the same length in all types of ship, about 300ft from round-down to barrier. The parking area, however, varies with the size of the carrier from 160ft in the case of an escort carrier, to 500ft in the largest Fleet carriers. Nowadays landings are always carried out with the safety barriers in operation, as the time to land-on a number of aircraft, and hence the time the carrier needs to steam into wind, is thereby greatly reduced. The sequence of events when landing-on a squadron is as follows: number one lands, catches an arrestor wire, is unhooked by the flight-deck party, and taxis forward over the lowered barriers which are then raised. Number two may now land immediately without fear of a misjudged landing imperilling number one. As the aircraft accumulate forward of the barrier they may be parked and "struck down" the forward lift into the hangar at comparative leisure and in adequate safety.

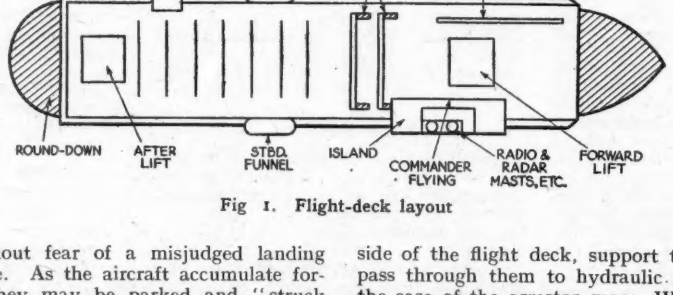


Fig 1. Flight-deck layout

Flight-deck Machinery

The number of arrestor wires varies from ship to ship, but a good average may be taken as ten. Their function is to bring the aircraft to rest smoothly and quickly and to "Self-centre it." That is to say, if a landing is made off the centre line, the aircraft is not, on engaging the wire, swung outwards, but continues along its original path. The actual mechanism of the arrestor gear is somewhat complicated, but the principle of operation is as follows: the wires pass below the deck and then round sheaves of pullies, which "gear down" the motion as in the case of the usual pulley-block arrangement. The resultant slow motion is applied to a piston working in a cylinder containing hydraulic fluid. This fluid is exhausted through an orifice against air pressure, the retarding force applied to the aircraft depending on the size of this orifice and the air pressure against which the fluid is exhausted.

Resetting Arrester Wires

A non-return valve prevents the aircraft from being dragged backwards down the flight deck, but when the aircraft is unhooked, this valve may be opened and air pressure used to re-set the wire ready for the next landing. The retarding force or "wire settings" are under the control of the flight-deck engineer and will be governed by the weight of the landing aircraft and the safe maximum force which may be applied to the arrestor-hook structure. If this safe maximum force is 1½ times the weight of the aircraft, we may retard at the rate of 1½ g, and if the approaching "ground speed" is 50 m.p.h., a simple calculation shows that the aircraft will be brought to rest in 50ft.

Carriers are normally equipped with two or three safety barriers, each of which consists of two horizontal wires with 2ft vertical separation and light wire cross-bracing. Two collapsible stanchions, one on each side of the flight deck, support the barrier wires, which pass through them to hydraulic rams below decks as in the case of the arrestor gear. When an aircraft hits the barrier, some part of its structure—undercarriage, airscrew, engine, etc.—becomes entangled in the wires, and the aircraft is arrested in a distance of about 20ft by the hydraulic rams. Should the wires of the first barrier be broken by the impact, there is a second ready to "do its stuff" with the now somewhat retarded aircraft.

The Deck Landing Control Officer

The function of the D.L.C.O. or, more popularly, "batsman" is well known. What may not be realized, however, is the full importance of his job and the amount of stress which the "powers that be" lay upon the obedience of the pilot to his signals. In the early stages of the war the

* See article "The Goofers' Platform" *Flight*, September 5th, 1946.

amount of notice taken of the D.L.C.O. was left to the discretion of the pilot, and the D.L.C.O. was regarded as a useful help or definite nuisance, according to his capacity for giving what the pilot thought the correct signal. As the Fleet Air Arm expanded, however, and the rate of training was speeded-up, the hours of flying which a pilot could accumulate before he was called upon to do his first deck landing were greatly reduced.

Meantime, shore stations were set up which provided intensive courses to fit the pilot for his first approach to the deck. At these establishments much emphasis was always laid on obeying the D.L.C.O., the theory being that far fewer D.L.C.O.s than pilots were required, and it was easier to train a few good D.L.C.O.s than a lot of good deck-landing pilots. The wisdom of this was well borne out in practice and, provided that blind obedience was not carried too far, the principle is sound because it is an undeniable fact that the D.L.C.O. is in a better position than the pilot to see when and how an aircraft is straying from the correct approach path.

Fig. 4. "Steady as you go." Batting-in a Barracuda, arrester hook lowered, on the final stages of the approach. Note attitude of the aircraft, which is too nose-up.

Fig. 3 illustrates the signals at the disposal of the batsman. Two signals, the "Cut" and "Go Round Again" are and always have been mandatory. The reason for the "Wave Off" being mandatory is that there may be something amiss on the carrier's deck of which the pilot is unaware, although he may be in a position to make a good landing. Likewise, the "Cut" must be obeyed, for even though the aircraft may crash, the consequences will be far less disastrous than if the pilot, at this late stage, attempts to open-up and go round again. The remainder of the signals are intended as a guide to the pilot, and if he cares to disobey them and lands successfully, well and good; but if deliberate disobedience results in a crash, disciplinary action against the pilot would inevitably ensue.

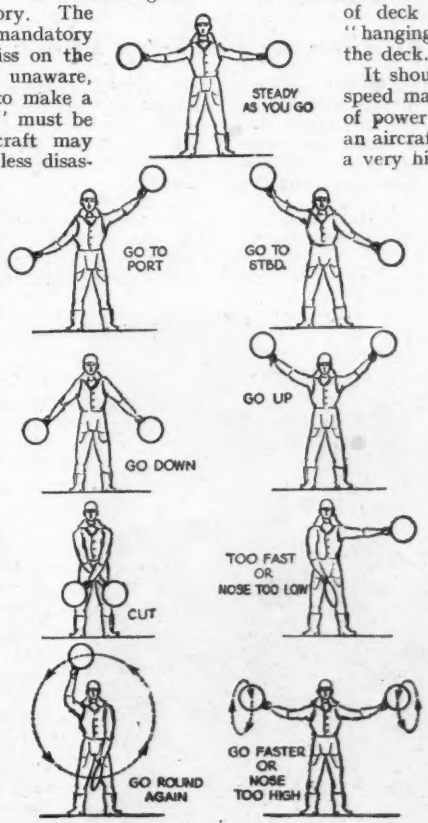


Fig. 3. Signalling code used by the "batsman," as seen by the pilot of an aircraft landing-on.

Deck-Landing Practice

The secret of a good deck landing is a steady "grooved" approach, the aim being to allow the aircraft to sink with a steady rate of descent and as little variation of power, air speed and altitude as possible, and at the same time to finish-up at the right point. The correct rate of descent and the correct air speed are the fundamental quantities.

The approach speed is fixed for any particular aircraft and should be roughly 5 m.p.h. above the engine-off stalling speed. The correct rate of descent is something which can only be learnt by experience, but as a guide, it is that rate of descent which requires a moderate amount of power, just enough to enable the pilot, by increasing or decreasing the power, adequately to control his rate of descent. It may be noted here that much nonsense is often talked about this aspect of deck landing, and one hears of aircraft "hanging by their props" when approaching the deck.

It should be remembered that the approach speed may be obtained with varying amounts of power at varying rates of descent. Thus an aircraft gliding at, say, 70 m.p.h., will have a very high rate of descent, whilst to fly level at the same speed will require almost full power. In the first case, the rate of descent cannot be increased, and in the second the aircraft can only climb with the greatest difficulty and much discomfort. On the deck-landing approach, therefore, the happy medium must be chosen so that slight variation of throttle will produce corresponding quick and comfortable responses in alteration to rate of descent.

In addition to achieving the correct rate of sink, it is also necessary to approach the deck from the correct direction. If the right amount of power is used, the attitude of the aircraft will be somewhat nose-up, and there are few, if any, aircraft which will give an all-round view ahead under these circumstances. Therefore, to keep the deck in sight, it is necessary to approach in a gentle turn from the port quarter of the ship. If this is done, the whole of the deck is visible when viewed through the port side of the windscreen, as the nose of the aircraft will then be pointing to starboard.

To achieve the foregoing in practice, under the high wind-speed conditions usually prevailing over

DECK LANDING

the deck, a standard circuit has been adopted. The pilot flies one mile ahead of the carrier, turns and flies downwind 1,000 yards from the port side of the ship, wheels and flaps being lowered as soon as this turn has been made; height 300ft. The turn-in is started when the aircraft is abreast; the round-down under standard wind-speed conditions of 25-30 knots; for greater wind speed the turn-in is commenced a little sooner, and vice versa.

Continuing this turn, the pilot reduces speed to the correct approach speed and begins to lose height, aiming to finish-up still in a very gentle turn just astern of the ship. Meanwhile, any corrections which the batsman signals, or the pilot's own judgment indicates to be necessary, are made immediately they become apparent. If corrections are made quickly they need only be slight, but if there is any delay the subsequent correction required is more violent, the approach may become unsettled and the pilot may find it impossible to get back in the "groove."

As for the actual touch-down, the object is to put the aircraft down on the deck so that it stays there; the arrester hook then has the best chance of picking up a wire. Excess speed, float and bounce are to be avoided, a three-point stalled landing abreast the batsman the ideal.

With the advent of jet aircraft, what changes, if any, in deck-landing technique will be necessary? The main difference is that the jet aircraft is less responsive to changes in throttle opening at low thrusts than its airscrew predecessor. New controls may be introduced in the future to overcome this, but recent experience seems to indicate that these may not be necessary. There are two reasons for this; first, jet aircraft have tricycle undercarriages and, consequently, may be flown on to the deck at speeds well in excess of the stall and stay put. This latitude in speed, therefore, can be used to alter the rate of descent despite the somewhat sluggish response of the turbine. Secondly, the pilot sitting in the nose of the aircraft has a perfect all-round view which, in itself, is a great advantage. It seems, therefore, that little change in present deck-landing technique will be necessary to cater for the aircraft of to-morrow's Navy.

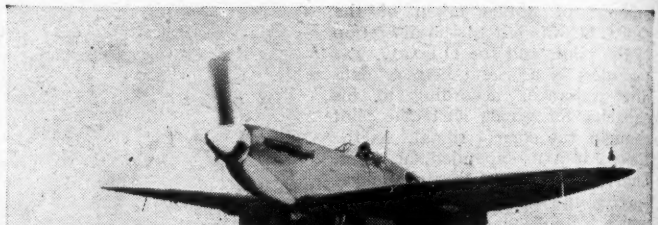


Fig. 5. Arrested. A Seafire makes a perfect landing. Note the wire supports; they are raised before a landing and lowered for taxying.

Remains of Juan de la Cierva Flown to Spain

CROYDON airport was the scene, on Monday, October 28th, of a moving scene when the remains of Juan de la Cierva were conveyed to his native Spain. It will be recalled that Cierva with many others lost his life in December, 1936, when a passenger in a K.L.M. Douglas which had just taken off from Croydon in bad visibility. The pilot got off his course slightly, and the machine struck a hillside.

The recent ceremony was attended by a number of Cierva's compatriots, including His Excellency the Spanish Ambassador, and the Spanish Navy, Army and Air Attachés. Cierva's son had come to this country a few days before to take the coffin back to Spain. He is, we understand, now studying engineering in Spain, but not aeronautical engineering. Great Britain was represented by many who had known and worked with Cierva during his struggles to develop the Autogiro, among them Wing Cdr. Brie, Mr. W. G. Leslie (secretary of the Cierva Autogiro Co., Ltd.), and Sqn. Ldr. Arkell (hon. sec. of the Helicopter Association of Great Britain).

The coffin was placed in one of the Dakotas of the Spanish Airlines and, after a brief prayer, the doors were closed, the engines run-up and the remains of a very great gentleman began their last journey. Cierva had many friends in this country, and his work here on rotating-wing aircraft laid the foundations upon which all subsequent development has been built. British aviation came to regard Cierva as one of its own sons, and it was fitting that his body should find a temporary resting place in British soil. His work in this country is a monument which will keep his memory fresh among all associated with rotating-wing aircraft.

The coffin is placed on board a Spanish Dakota.

R.-R. NENE AND DERWENT ENGINES FOR RUSSIA?

THERE has recently appeared in the British daily Press, a number of statements concerning the sale of Rolls-Royce Nene and Derwent jet-propulsion units to Soviet Russia.

No reference to this reported transaction has previously been made in *Flight*, and we have been informed by Rolls-Royce, Ltd., that such statements were entirely unofficial and premature.

At the moment of going to press, no other official statement is forthcoming, either from the manufacturers concerned or from the responsible Government department, but if and when any such transaction is authoritatively announced, it will be duly recorded in *Flight*.

The Saro SR/A1

A Single-seater Flying Boat with Fighter Performance

THE flying boat has been out of the high-speed picture since 1922. In that year the Schneider Contest was won by Henri Biard on a Supermarine flying boat powered by a Napier Lion engine. The speed was 145 m.p.h. The following year the Supermarine Sea Lion III flying boat was handsomely beaten by an American Curtiss floatplane piloted by Lieut. Rittenhouse of the U.S. Navy. His speed was 177 m.p.h. From that time onwards the floatplane and landplane were the only types considered where high speed was wanted. The flying boat has continued to do good work, and does so to this day, but not in the really high-speed range.

Jet propulsion has changed the flying-boat picture as it has changed so many other conceptions, and the new Saunders-Roe SR/A1 single-seater is definitely in the fighter class, both as regards performance and armament.

This photograph of a scale model gives a very good idea of the clean lines of the Saro SR/A1 jet-propelled fighter.

In the days of piston-driven airscrews, it was necessary to mount the engine well above the hull, in the single-engined type, and in a small boat the water clearance was not sufficient, unless the hull had a greater freeboard than was necessary, for the engines to be mounted outboard in the wings. The jet needs no water clearance (except for the air intakes, of course), and in the SR/A1 good use has been made of this fact. Two jet units are installed side by side in the hull, and the Metropolitan-Vickers F2/4 was selected partly on account of its small overall diameter, which has made it possible to place two units side by side without materially increasing the hull width beyond that which is in any case demanded by hydrodynamic considerations. Thus the actual form drag of the two power units has been eliminated, and the wing can be designed for high speeds, without excrescences that would cause local Mach-inations. The two steps of the hull do, of course, form a break in the otherwise clean contour, but even they are of low-drag form.

There are other advantages in keeping the two power units close together. The jet outlets emerge from the sides of the hull just aft of the trailing edge of the wing. This means that the two thrust centres are only separated by the beam of the hull, or something in the neighbourhood of 9ft. Consequently, there is but a small yawing moment when one engine is stopped, and the rudder is well able to take care of that without causing any great increase in drag.

In addition to the good single-engine flight characteristics which the close spacing of the thrust centres makes possible, the range of the machine can be extended very materially by cruising on one engine. With a piston engine, fuel can be conserved (for slow cruising) by throttling both engines. The jet unit is not quite so amenable to this treatment, but by stopping each of the two units alternately quite a reasonable mileage per gallon can be obtained, and the extra speed is always available when required. This may appear a somewhat extravagant way of obtaining range, but it should be remembered that jet units are very light for their power, so that the "useless weight" represented by the stopped engine is not so great as it would be with piston engines.

The Air Intake

The one feature of the installation about which there might be some doubt is the air intake. This is placed in the bows of the hull, where the ram effect is greatest, but the possibility does appear to exist of water spray getting into the intake. However, very extentive tank-testing of models has shown that in normal operational conditions there is not likely to be any trouble on this score. In a fairly rough sea, however, there would appear to be a certain amount of risk. Only actual operation can prove or disprove this.

As for the airframe itself, it is of orthodox high-wing design, with a stepped hull and single fin and rudder. Lateral stabilization on the water is by outboard floats, which are retractable. The hull construction is the usual Saunders-Roe, with closely spaced frames and relatively light stringers. The high-speed section wing has a single main spar, an aspect ratio of 5:1, and a taper ratio of 2:1.

The pilot's compartment is pressurized and is located ahead of the wing, giving a good field of view. It is provided with an emergency ejection device. The armament comprises four 20 mm cannon mounted in the nose of the hull, and hinged covers facilitate rearming, etc.

The form of the hull, as will be seen from the photograph of the scale model, is very clean, and the shape of the two steps bears evidence of Mr. Gouge's influence, with the front step having a pronounced vee-shape in plan form, and the aft step coming to a vertical knife edge. The picture also shows that the jet units cause but a very slight bulge in the hull sides forward, and that the jets will be well clear of the raised tailplane.

Picking-up moorings has always been something of a problem in single-seater seaplanes, but the Saro automatic mooring scheme evolved by Mr. Arthur Gouge, described in *Flight* some months ago, is especially suitable for this work, and the pilot can pick up his moorings without leaving the cockpit and without external assistance.

Main dimensions of the Saro SR/A1 are as follows:

Length o.a.	50ft
Wing span	46ft
Height	17ft
Hull beam	6.83ft
Wing area	415 sq ft

ROYAL AIR FORCE RESERVES

New Scheme for University Air Squadrons : Recruiting for the Auxiliary Air Force to Commence at Once

UNIVERSITY AIR SQUADRONS

DURING last week details of the new scheme for the maintenance of eleven University Air Squadrons and for the commencement of recruiting for Auxiliary Air Force units have been announced. With the beginning of the academic year the new scheme for the eleven University Air Squadrons comes into operation. The Universities, names and addresses of Commanding Officers and the airfields from which the squadrons will operate are as follows:

Aberdeen: Flt. Lt. A. A. Francis; Marischal College, *Dyce*.

Belfast (Queen's): Flt. Lt. C. C. Johnston; 18, College Gardens; *Aldergrove*.

Birmingham: Flt. Lt. S. J. Fielden; University of Birmingham; *Castle Bromwich*.

Cambridge: Wing Cdr. Viscount Acheson, O.B.E.; Fen Causeway; *Marshall's*.

Edinburgh: Flt. Lt. D. W. Gallogher; 41, George Street, 8; *Turnhouse*.

Glasgow: Flt. Lt. R. A. Innes; 4, University Gardens; *Abbot's Inch*.

London: Wing Cdr. D. W. Reid, D.F.C.; Imperial College, Exhibition Road, S.W.7; *Biggin Hill*.

Manchester: Flt. Lt. I. T. Chambers, D.F.C.; 12, Lime Grove; *Barton*.

Nottingham: Flt. Lt. E. Cornish; 72-74, Broadgate, Beeston; *Hucknall*.

Oxford: Wing Cdr. J. R. A. Embling, D.S.O.; Manor Road; *Shellingford*.

Southampton: Flt. Lt. K. S. Booth, A.F.C.; University College; *Eastleigh*.

The scheme, which is on a provisional basis, is designed for two classes of students—ex-R.A.F. pilots, and men who have not served in any of the armed forces. The second category will be able to prepare themselves for commissions in both regular and non-regular Air Forces and complete the basic flying training syllabus during their University course. Ex-R.A.F. pilots will be able to keep in flying practice.

Ranks

The ranks of members of the squadrons will be as follows: ex-R.A.F. officer pilots will be given short period commission as Flight Lieutenant or below and ex-R.A.F. airmen pilots as Pilot Officer. New recruits will have the rank of cadet pilot and the status of officer cadet.

Members of the squadrons will be required to complete at least 20 hours' flying training each year during term time, and 15 days' continuous training at an R.A.F. station during vacation. Ground training will also be provided as necessary. The Universities interested primarily in engineering—Birmingham, Nottingham and Southampton—are expected to provide candidates for the technical branch of the Air Force, but all University squadrons will work to the same flying and ground syllabus.

As a start Oxford, Cambridge and London squadrons will each be equipped with three Tiger Moths, rising to five; all others except Glasgow will have two Tiger Moths, rising to three. Glasgow will be equipped with Magisters.

Members of the staff, being regular officers, will wear uniform during working hours; other members of the squadron will only wear uniform as ordered on special occasions.

University students who wish to join their air squadron should apply to the Commanding Officer of the unit concerned at the addresses given above.

Ex members of Services other than the Royal Air Force are necessarily excluded from this scheme because of liability to recall to their Service.

THE AUXILIARY AIR FORCE

Recruiting for the reconstituted Auxiliary Air Force will open on Friday, November 8th. The flying squadrons will consist of four light bomber, 13 day fighter and three night fighter squadrons. Each squadron will be a fully equipped front-line fighting unit, and there will be vacancies not only for flying members but also for ground trades and for technical, medical, administrative and equipment duties. About half the flying personnel in each squadron will be commissioned. Officers will be commissioned for five years and airmen will sign on for four years. Applicants must be ex-members of the Royal Air Force, British subjects, and medically fit. For flying duties candidates must not have attained the age of 30 on the date of application, for technical duties the age limit is up to 35, for administration or equipment duties up to 50, and for medical duties up to 40. For ground trades the age limit is 38 on the date of application.

Rates of Pay

Provided they have fulfilled their training obligations, namely, 15 days' continuous training each year, plus 100 hours' non-continuous training during the evenings and 12 week-ends, and including a total of 125 hours' flying, pilots and navigators will receive an annual retaining fee of £35.

Officers will be paid at normal Service rates for the annual camp and other periods of continuous training of more than 48 hours. For periods of less than 48 hours a training expense allowance of 1s 6d per hour up to a daily maximum of 9s will be paid. Provision is also made for travelling expenses, medical benefits and compensation for injury or death.

The bounty for airmen is £8 a year made up of two parts, £5 for fulfilling minimum requirements, and a further £3 for satisfactory fulfilment of extra training.

For the annual camp and unbroken training periods of over 48 hours men will be paid at normal airmen rates; for periods of less than 48 hours an hourly expense allowance from 9d to 1s 6d according to rank and duty, and with a daily maximum, will be payable. To qualify for the minimum bounty, airmen must do 15 days' continuous training, 30 hours' non-continuous training in the evenings and six week-ends. To earn the extra £3 they must do a further four week-ends and an additional 12 hours in the evenings. Uniform will be issued to airmen free of charge.

Pamphlets outlining conditions of service are obtainable from squadrons or from the local County Territorial Army and Air Force Association. Squadron commanders will recruit their squadrons locally under the direction of the County Associations. The numbers of the squadrons and names of commanding officers were published in *Flight* of September 5th, 1946. The addresses are:

No. 500 (County of Kent): West Malling, Maidstone, Kent.
No. 501 (County of Gloucester): Filton, Nr. Bristol.
No. 502 (Ulster): Aldergrove, Crumlin, Co. Antrim.
No. 504 (County of Nottingham): Hucknall, Nottingham.
No. 600 (City of London): Biggin Hill, Westerham, Kent.
No. 601 (County of London): The Hyde, Hendon, N.W.9.
No. 602 (City of Glasgow): Abbot's Inch, Renfrewshire.
No. 603 (City of Edinburgh): Turnhouse, Edinburgh, 12.
No. 604 (County of Middlesex): The Hyde, Hendon, N.W.9.
No. 605 (County of Warwick): Honiley, Kenilworth, Warwickshire.
No. 607 (County of Durham): Ouston, Stamfordham, Newcastle-upon-Tyne.
No. 608 (North Riding): Thornaby, Yorks.
No. 609 (West Riding): Church Fenton, Tadcaster, Yorks.
No. 610 (County of Chester): Hooton Park, Wirral, Cheshire.
No. 611 (West Lancaster): Woodvale, Formby, Liverpool.
No. 612 (County of Aberdeen): Dyce, Aberdeenshire.
No. 613 (City of Manchester): Ringway, near Manchester.
No. 614 (County of Glamorgan): Llandow, Cowbridge, Glamorganshire.
No. 615 (County of Surrey): Biggin Hill, Westerham, Kent.
No. 616 (County of Yorkshire): Finningley, Doncaster, Yorks.

It is of interest to recall that the Auxiliary Air Force represents the fusion of the original Auxiliary Squadrons and the Special Reserve Squadrons, and is the "Territorial Army" of the R.A.F. It was brought into being by the Auxiliary Air Force and Air Force Reserve Act of 1924.

By sea, and by land, Britain has led in transport development since Tudor days. Now, by air, a 'Tudor' leads again . . .

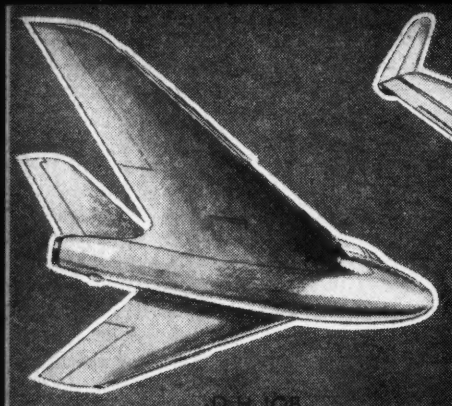
FOR centuries, Britain has been the pioneer in world transport development. It is her natural sphere. First came her ships and railways; now she is pioneering in the air, where Avro have consistently led for nearly 40 years. Latest of a long line of successful aircraft is the Tudor II—designed to balance performance, capacity and comfort, without any sacrifice in reliability. The Avro Tudor II has a top speed of well over 300 miles an hour with an economical cruising speed of 235 m.p.h. Its pressurised, temperature controlled cabins accommodate from 40 to 60 people in more-than-'Pullman' luxury for ranges up to 3,000 miles.

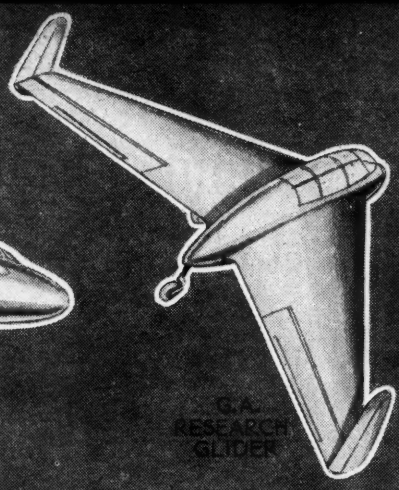
a superplane by

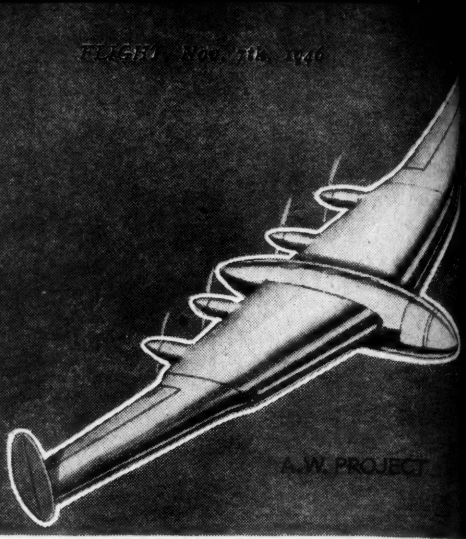
AVRO

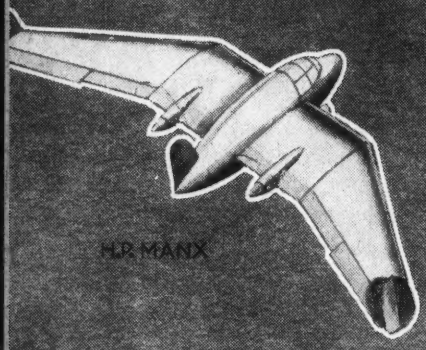
A. V. ROE & CO., LTD., MANCHESTER, ENGLAND (Branch of Hawker Siddeley Aircraft Co. Ltd.)

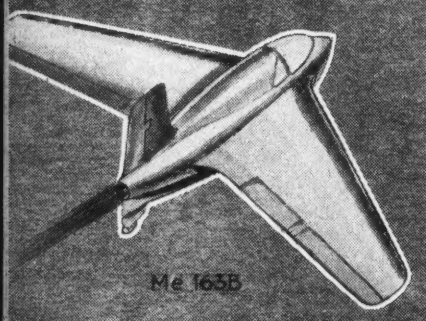
THE AVRO TUDOR II

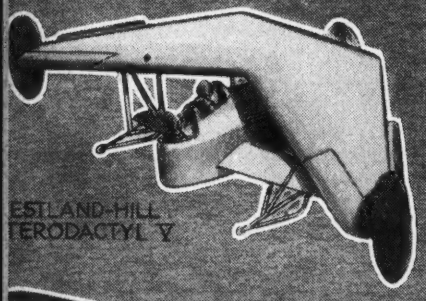


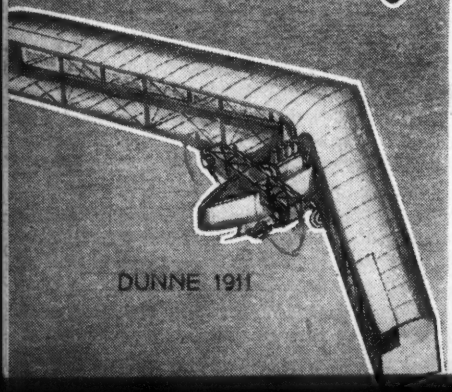












"SPEARHEAD" AIRLINER

Futurist Transport with Four Turbines Driving Contra-rotating Pusher Airscrews

INDICATIONS are not lacking that aircraft with swept-back wings will be a feature of design as speeds approach the supersonic barrier. Straws sho which way the wind is blowing. Already a number of futurist designs small single-seat aircraft have been evolved, and examples have been flow successfully in this country, in Germany and in America. German technician early recognized the importance of swept-back (or swept-forward) wings to dela and reduce compressibility effects, and were carrying out a comprehensive pro gramme of wind-tunnel experiments. In some cases the smaller aircraft wit pronounced sweep-back have been announced as forerunners or prototypes larger craft in view.

An impression of a "tailless" design of air liner of 120 to 150ft span with larg sweep-back to the wings and propelled by four gas-turbine units, each of som 3,000 h.p., submerged in the wings, is the subject of the accompanying drawing Air is induced via the span-wise slots arranged at the point of maximum thick ness of the wing to effect control of the boundary layer. The conception is offered in response to the requests of many readers who have invited drawing of possible types of large-scale liners of the future and embodies features now being actively examined and studied by aircraft project engineers. The possibl future types of aircraft are of great interest to flying enthusiasts.

The adoption of swept-back wings on a project not intended for sonic—o even near-sonic—speeds may cause some surprise. It has already been ex plained, however, that shock waves may be formed on structures travelling at less than the speed of sound, provided the local speed on some part of the body exceeds that of sound. In Germany a number of designs existed of swept back and swept-forward wing aircraft which had an ultimate speed of some 500 to 550 m.p.h. Teutonic engineers had proved that very great advances in critical Mach number are possible for wings having large degrees of sweep-back. On the other hand, low-speed problems become difficult with an aircraft having wings with an angle of sweep-back of the order of 65 deg or 70 deg, nor are the constructional problems involved in the wing attachment easy of solution.

Nevertheless, in the absence of practical designs, and as a foretaste of the shape of transport aircraft to come, the projected design is proffered for study and comment. Pending the perfection of large pressurized cabins of proved reliability (and that in itself is a bigger problem than is generally realized) the operational range and altitude of commercial aircraft will, almost certainly, be shorter and lower than recent prognostications would suggest. For that reason the turbine-airscrew combination is expected to enjoy a useful life during an intermediate period, which will eventually lead to pure jet propulsion and the flying wing.

In the suggested design illustrated (the drawing was executed by H. Redmil from rough sketches prepared by *Flight*) which, it will be observed, has contra rotating pusher-type airscrews to each turbine, the sweep-back is of the order o 45 degrees.

The effectiveness of ailerons and flaps decreases rapidly with increased sweep back, and directional stability being affected, considerably more fin area necessary than in the case of a straight-wing design. G. S.

WHAT IS *Imitation?*

Imitation, like beauty, is rarely more than skin deep; the test of an imitation is not what it looks like, but how it behaves. It is deceptively easy to give an aircraft seat the *appearance* of good design, but to achieve real comfort is a different matter. Generally speaking, there are so many other factors involved that it is quicker and less costly to take seating problems to Rumbold in the first place.

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American Newsletter

The Cost of Large Civil Aircraft : Who Will Foot the Bill? : Flying the N.A. Navion : Record Rumours

By "KIBITZER."

THE time has come when the aircraft manufacturer can no longer absorb, by himself, the entire design and development costs of a large aircraft. By "large," one means 75,000lb or over. During the war, the Government footed the bill and in the immediate post-war period the operating companies reaped the benefit. From now on, however, and before a big aircraft is built, the manufacturer must know who is going to buy and pay for it. He can no longer afford to design and produce an aircraft and then try to sell it. Orders, or at least a guaranteed payment towards the development costs, must come first.

The case of the Douglas DC-7 may well have been the turning point. Requested in fairly large quantities by the U.S. Government before the war ended, the order was said to have been drastically reduced after VJ-Day. In the meantime, orders from commercial operators had been obtained, but when the Army contract was cut, the cost per aircraft correspondingly increased, and it finally reached a figure which the operators could not accept. The result was the cancellation of production of the commercial machine.

Some of the manufacturers are quite open about the fact that they cannot go ahead and design and produce a big machine on the off-chance that a government or an airline will buy a sufficient number to absorb the enormous development costs. On the other hand, the airlines themselves may not feel that they can guarantee to order, or pay for the production of their new equipment until it has proved itself. Consequently, it may once more become the responsibility of the government to subsidize the production of a suitable type.

In practice, it would seem that the best way to manage this would be for the various Air Force Transport Commands to order machines to a suitable specification which had been agreed with the airline operators. But would those two, who are diverse in their apparent requirements, get together? One believes it would be more likely to happen in the States than elsewhere, due to the fact that commercial thinking runs so much more deeply through the armed services. But the British system, whereby the Government issues specifications and subsidizes production, may pay off in the long run.

An immediate problem of this nature concerns the need for the production of a really big, modern and efficient freighter. Aircraft of the "tramp steamer" type will have their place and can be produced without great cost, but a freighter of 100,000lb a.u.w., complete with refrigeration and suitable compartmentation, is another matter. Such aircraft will come and, as soon as sufficient data are available on the requirements of the freight operators, someone is going to build one. Already two or three of the larger concerns in the U.S. are collecting all the facts that they can and, when they do start designing, are proposing to apply every successful modern aerodynamic principle in order to produce the best possible aircraft.

* * *

The North American Navion is now in production, and the first machines, destined for the area distributors, are delivered. On the whole, this has turned out to be a very nice little aircraft. Even if the rather optimistic performance figures that heralded its birth have not been met, it is still an excellent job, with a range and cruising speed and consumption that make it an attractive proposition for anyone who wants to tour around the country.

A short flight in one of the early demonstrators showed very little cause for criticism. Entry, via the leading edge and a fixed step, is easy, although an exit with the engine running might be dangerous. It is admittedly difficult to see how else to get in and out of it, but some form of automatic warning, or engine cut-out, might be devized to prevent inexperienced passengers from walking forward into the airscrew after they have left the machine. The cockpit is really good. It has a great deal of room, is comfortable, well equipped, and has a magnificent all-round view. Taxying is easy with the steerable nose-wheel, which is controlled by the rudder pedals, but the brake handle isn't as good as it should be. It is too far away from the pilot, is awkward to operate and is stiff, but this comment, and it is not a serious one, is about the only criticism that one can make about equipment, handling, or performance.

The take-off is easy, with no tendency to swing, but the machine must be lifted off the ground. Once in the air, the climb is good, the view is good and the controls are well harmonized. There is a slight nose-up change in trim as speed is increased, and the lowering of the flaps and undercarriage make the machine nose heavy. At cruising speed the machine is very smooth and quiet and is stable enough, particularly directionally, while the adjustable seats give lots of leg room and considerable comfort. Stall characteristics under all conditions are definitely good; there is no tendency to drop a wing and the lateral control remains to the last. Approach and landing are easy enough and one gets out of the cockpit feeling that one has just flown a machine well designed and well engineered and developed by people who really knew what they were after—which, after all, is not altogether surprising.

The sales competition between this aircraft and the new Beechcraft Bonanza will be interesting to watch. With equivalent equipment, there won't be much to choose in price (both will be something over $7,000), and the engines and seating capacities are the same. At equal power outputs, their performances may be almost the same, but the Bonanza, due to its lower drag, may have a slight edge over the Navion in both speed and range. Any sales advantage of this will be offset by the two or three months' start which North American's have obtained over their rivals. In any case, a private owner, who can't get delivery of one type, won't be doing so badly if he buys the other.

* * *

Attempts on the world's speed record still continue. It is possible to hear five rumours a day, all different, on what has happened, or what is going to happen. Amongst the latest crop are the following: (1) That the new P-80R, which had modified wings, redesigned entry ducts and cockpit hood, failed badly and did not do over 610 m.p.h., and has now been returned to the Lockheed plant at Burbank. (It is also said that it overshot on landing and ran through the boundary fence, but this may be just malicious gossip!) (2) That the Republic P-84 has developed trouble and has been dismantled and flown back in a C-54 to Long Island. (3) That the new Navy jet fighter, built by North American, has an excellent turn of speed and may try for the record.

Knowing nothing whatever about it, one waits, like the rest of the aircraft industry, for something official, but it does seem that the Americans will have to get some more thrust from somewhere before they reach a speed of 630—which is what they are said to be shooting for. In the meantime, they will certainly go on trying for a record of some sort, perhaps the 1,000 kilometres, and the Muroc Lake course will not be quiet.

Britain's Test Pilots

No. 15
SYDNEY ALBERT THORN,
CHIEF TEST PILOT, A. V. ROE & CO., LTD.

The years between. Major S. A. Thorn standing by his Sop-with Snipe in 1925, and a recent photograph of him at the controls of the Avro York.

"BILL" THORN, as he is known to the whole industry, has had a very varied career, having been a time-serving soldier in the Guards, an officer in the Royal Air Force, a flying instructor, and a major in the Home Guard.

His first recollection of things aeronautical is being taken by his mother, at the tender age of nine, to watch some very early flying at Wormwood Scrubs in 1910. This experience created in him somewhat of an obsession for flying and, during his holidays from Hurstpierpoint College in the years of the 1914-18 war, he spent most of his days, with a packet of sandwiches, sitting on the edge of Shoreham airfield watching the Avro 504s and Maurice Farmans perform. His most interesting day was a famous occasion on which no fewer than thirteen machines were piled up. Here he made his first flight. Having by much hero worship persuaded a major of the R.F.C. to come home to tea, he also persuaded him to take him for an unofficial flight in an Avro 504—and was very scared for his trouble.

The end of the Great War saw him in a factory near Brighton, making submarine parts, but by his eighteenth birthday in August, 1919, he was out of a job. Added to this his father had died and his mother was not very well provided for.

Without telling anyone of his intentions, and with the munificent sum of 15s in his pocket, he came to London to join the Army. Having taken the oath, he picked his regiment at random and decided on the Coldstream Guards. Even the recruiting sergeant—once he had the body in the bag—called him an adjectival fool. Not because he had joined the Guards, but realizing that he wasn't the normal type which joined the Army in those days, and knowing at the same time of the intention of the authorities to get the Guards regiment back to pre-1914 standards. The next six months, which he spent at the Guards depot at Caterham, would have broken most people's hearts. As a recruit he had to address even the ordinary guardsmen in the prescribed manner, "Yes, trained soldier," or "No, trained soldier." Living conditions were both rigorous and primitive.

In 1922, having served his three years with the Colours, he came of age and inherited some money. This he invested in a poultry farm in Surrey. With his brothers he slaved for the next three years until, like thousands of similar projects at that time, the farm failed.

Making yet another start in 1925, he took a short-service

Leading a flight of Hawker Woodcock night fighters of No. 17 Fighter Squadron.

commission as a pilot in the R.A.F. and was posted for training to No. 5 F.T.S. at Sealand. His *ab initio* instructor was none other than Jim Cordes (later chief test pilot for many years of Handley Page, Ltd.), and his C.O. was Wing Cdr. Philip Babington, M.C., who retired recently as Air Marshal Sir Philip Babington, K.C.B.

The primary type was the Avro 504 with rotary Monosoupape engine, but Bill did not, at this stage, prove a very apt pupil. He took 16 hours to go solo and was very nearly turned down. It was not until he got on to Sopwith Snipes under Eddie Fulford that he made up for his earlier backwardness.

After qualifying he was posted to No. 17 Squadron at Hawkinge, which was then equipped with Hawker Woodcocks—the first night fighter, designed as such, to go into service. When the Central Flying School left Upavon for Wittering, No. 3 moved in, and it was whilst he, as a junior officer, was ferrying one of the Woodcocks that he had his first forced landing. Arriving in the region of Guildford, the weather clamped down both fore and aft, and Bill put the Woodcock down on Cranleigh School rugger ground. Weaving in and out of the various posts as he slowed up, he was unfortunate enough to hit his starboard main planes on the last pair of goal-posts. The portion from above the cross-bar whistled down and, just missing the cockpit, stood quivering in the ground. In a matter of seconds, of course, that football ground was a milling mass of schoolboys, and the Woodcock suffered more damage from them than from the forced landing.

The Woodcock also gave him an unhappy few minutes one very dark night when he was flying at 1,500ft over Southampton. His engine cut dead and, as he had been trained to do, he looked out for an unlighted area in which to land. As he selected the place, the inevitable thought came into his mind, "Is it open?" "Is it woodland?" At 500ft he lit one of his Holt wing-tip flares and turned to make his final approach into what, in the dim light, appeared to be parkland. As he fired his second Holt flare at 300ft, to light his actual landing, the Jupiter picked up and functioned again as if nothing had happened. Presumably a stoppage in the fuel system.

Discussing the flying characteristics of the Avro Tudor I with Sir Roy Dobson and Roy Chadwick after an early prototype flight.

Acting as escort to H.M. The King during an inspection of the Home Guard unit with which he served.

It was also whilst flying Woodcocks in 1927 that he had a rare experience. Lindbergh had just flown the Atlantic to Paris and then come on to England, and his aircraft was dismantled for the return passage. As Lindbergh wanted to go to Paris again on his way back, the Air Ministry put a brand new Woodcock (Bill Thorn's) at his disposal. Thorn went by train and boat to Paris to fly it back. When Lindbergh arrived at Le Bourget the enthusiastic crowd broke all the barriers, and he had to open-up and do an extra-quick hop to the hangars on the far side of the airfield, where the Woodcock was hurriedly housed and the doors closed a split second before the crowd arrived.

Toujours la Politesse

The arrangements for Bill's departure included, first of all, an aerobatic display by him, and then a journey to the French coast escorted by a formation of French fighters. All would have been well had not Bill lost his maps during a slow roll in his display, and then tried to make the Frenchmen take the lead in order to get a bearing. Their native courtesy precluded them from doing any such thing, and it is easy to imagine them all waffling about the sky in a semi-stalled condition doing an "after-you-Claude" act. Finally Thorn pointed his Woodcock roughly in the direction of England and took the lead.

In 1927, as a flying officer, he was offered a posting to the R.A.E. at Farnborough as a test pilot, and served there for the next two years, flying such aircraft as the Bristol Berkeley, Vickers Venture, Westland Yeovil and Gloster Goldfinch.

The Fairey Fox, the Curtiss D.12 engine of which was the first type ever allowed by the Air Ministry to have its carburettor placed between the cylinder banks, caught fire whilst he was flying it, but fortunately the flames subsided before any serious trouble occurred.

On the prototype Bulldog, at 4,000ft, he went into a spin which altered its characteristics, immediately becoming flat and staying so until a burst of engine and stick

BRITAIN'S TEST PILOTS

movement together jerked it out at less than 1,000ft. After landing, his story was politely disbelieved, and he looked even sillier when, later, he tried to reproduce it in the air and failed. His vindication came six months afterwards, when Poppy Pope had it happen to him at Martlesham.

At the R.A.E. there was a light plane club—of which "George" Bulman was the original pilot and chairman—and Thorn in 1929 flew the club's Avian Q.N. to many of the week-end meetings held at that time. It was at one of these meetings that he met Capt. T. Neville Stack, R.F.C. (now a Commander in the Royal Navy with two sons in the R.A.F.) who was the chief test pilot of Aircraft Disposals Company (the company responsible for selling the surplus aircraft left over after the 1914-18 war and the forerunner of Cirrus Engines). Stack told Thorn that he was leaving A.D.C., and Bill took over in his place, and remained there until the company ceased to operate.

For a short while after this he became an instructor at Shoreham, where F. G. Miles—now the head of the big Miles Aircraft concern—ran a small flying school, built a couple of aircraft of his own design, taught his wife to fly, and lived in a caravan on the airfield.

The next two years or so he spent as sales manager and instructor with Brooklands Aviation, Ltd., running the Northampton Club for some part of this time. Later he joined Birkett and Brian Allen.

As a charter pilot in those days he had a number of exciting trips, of which two are outstanding. The first was a Puss Moth charter to Belgium with an eccentric but rich man as his passenger. He gave Bill £180 to spend on himself for the first evening and then, when most people were going to bed, told Thorn that they must start at once for Cairo. When Bill told him you couldn't start just like that, he started a fight in the bar. This was exceedingly foolish because among Thorn's many accomplishments he had won the Wakefield Officers' Middleweight Championship, the Officers' Open Championship, and the Officers' Open Light-Heavyweight Championship. On his passenger's recumbent form the bartender expended most of a siphon of soda water to bring him round. Later, on the way home, whilst circling Calais before setting out across the Channel, this passenger (in the back seat) put his arms round Bill's neck and tried to throttle him. The Puss Moth was left to its own devices while Thorn turned round and laid his passenger out a second time.

Fog and Darkness

Another Puss Moth charter gave him the closest shave he had had in 21 years' flying. He had flown a couple to the Channel Islands and landed on the beach at St. Aubins at low tide. Aircraft cannot be left on the beach with the water coming in, so despite the lateness of the hour and the absence of any night-flying equipment or other aids, he started back for England. In failing light the bad weather forced him down to within 50ft of the water, and there was no alternative but to climb up through the muck and go on by dead reckoning.

By the time he surmised he was over the coast it was quite dark and his descent through thick cloud with no blind-flying panel was no small feat of pilotage. Spotting a line of lights, he circled them, only to find it was a liner going up Channel. Turning north for ten minutes, a coast town showed up, but Bill was unable to identify it, and he went on in the hope of being able to pick up the lights of London reflected in the cloud base. In this, however, he was defeated by fog, and back again he went to the coast-town—still unidentified. Petrol had now become low and a landing had to be made with no Holt flares nor landing lights to help him. No selection of area was possible, just a straight blind flop into an abyss.

Thorn is not what one would call a religious man, but as he made his approach he recited the Lord's Prayer out loud. After a short run and a couple of hefty bumps, the Puss Moth stopped and the light of a match showed everything intact. Daylight revealed that he had got down in a field 180 yards long, that he had bounced over one irrigation ditch and stopped two yards before another. Apparently, quite unbeknown to Thorn, there had been a freak wind of 35 m.p.h. above the clouds, and calm conditions at ground level. Had it been a little stronger he would have been blown off his course so much that he would have missed England completely and run out of fuel over the North Sea. The unidentified town was Eastbourne.

In his A.D.C. days Thorn had met Roy (now Sir Roy) Dobson of Avros, and in 1934, when he wanted a change, he asked if he could come on the test-piloting staff. H. A. ("Sam") Brown, who was then the chief test pilot, and who did all the first Avro prototype flights up to and including the Lincoln, was away in S. America; J. B. Tompkins was holding the fort. Thorn came in as third dicky to help finish-off the production-testing of the Tutor, Avro 641, Cabin Cadet, Commodore and C.30 Autogiro.

In 1935 he spent much of his time demonstrating Avro aircraft on the Continent, notably in Greece, Denmark and Turkey, and then late in the year, when Tompkins left Avros, he stepped up to assistant chief test pilot. At this time the Avro Anson was being produced. It was one of those aircraft which came out almost perfect right from the beginning. Its only trouble was a tail vibration which tended to build up. It was cured by putting streamline wires from the fin to the tailplane. Over 7,600 Ansons have been produced since then and given wonderful service.

Sam Brown did the initial flight tests on the Manchester, Lancaster, York and Lincoln, but an enormous amount of development flying had to be done on these types, and Thorn put in a very large share. On the Manchester he had five forced landings through main bearings failing in Vulture engines. Now, with Jimmy Orrell as second pilot, he is putting Tudor Is and IIs through their paces and waiting for some very interesting types which are not yet at the flying stage.

In 21 years' flying Bill Thorn has piled up some 5,500 hours' flying, on 110 types. He has test-flown and cleared over 3,000 aircraft himself. In the whole of his career he has smashed only one machine. This was a Desoutter with Hermes engine. A flat-spot in the carburation caused him to undershoot, and he finished up with his face in the valve rockers.

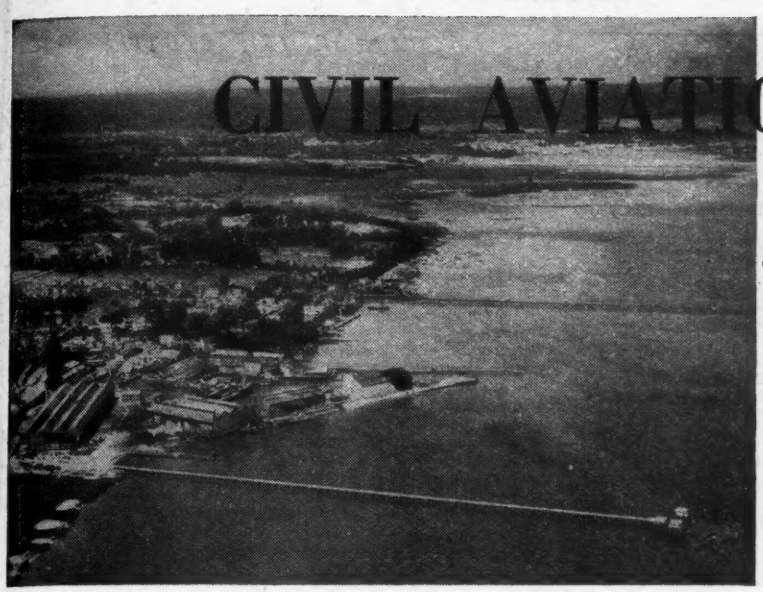
In addition to his boxing prowess mentioned earlier, he won the Aldershot Command ¼-mile in 1921 and was second in the British Army ¼-mile. He is also an artist at water polo, as Boscombe Down realized this year.—J. Y.

GERMAN TECHNICIANS FOR BRITAIN

TEN German technicians are being brought to this country this month for employment at the Ministry of Supply Guided Projectiles Establishment, Westcott. Several more technicians will join the team later. The employment of these men is in accordance with a scheme outlined in May by Mr. Arthur Woodburn, M.P., Joint Parliamentary Secretary to the Ministry of Supply, when he announced that German scientists were to be employed at the Royal Aircraft Establishment, Farnborough.

The ten Germans coming to Westcott, like all others, have signed contracts on a voluntary basis and are keen to work in this country, says the Ministry of Supply. Full provision for the safeguarding of security precautions will be taken and restrictions will be enforced similar to those affecting enemy aliens. They are Johannes Schmidt, engineer; Herman Treutler, physicist; Jurgen Diedrichen, chemist; Gustav Fiedler, designer draughtsman; Johannes Frauenberger, designer draughtsman; Heinz Walder, experimental engineer; Carl Meier, experimental engineer; Walter Kolterman, foreman fitter; Walter Mueller, designer draughtsman; and Friedrich Jessen, experimental engineer.

At present 26 German scientists are working at Farnborough on aerodynamics, jet propulsion, metallurgy, helicopter development, thermodynamics, autopilots and gyros. Negotiations are in progress for the employment of fifteen more Germans, including four radio experts, at Farnborough. Also in this country are five turbine scientists employed by C. and A. Parsons, Newcastle-on-Tyne.



CIVIL AVIATION NEWS

Channel Islands Airways Situation: Weather Forecasting Service: B.E.A. Circular Trips

HYTHE: The B.O.A.C. flying-boat headquarters and maintenance base. The pontoons can be seen at the end of the pier.

STILL FLYING

TEN years ago the Empire or "C" Class flying boats started operations which set a standard in comfort and reliability probably not yet achieved by any landplane. The history of this class is fascinating, and such names as *Cambria*, which took part in the evacuation of Greece, and *Clare* and *Clyde*, which flew special flights during the war, will be remembered. These boats will come out of service with the closing of the flying boat route to South Africa, and, in recognition, the new Stratocruisers on order for B.O.A.C. are to be named after six of them.

The post-war fleet of Short Hythe Class boats is now complete and operating in Number Four line of the Corporation. The headquarters and maintenance base are at Hythe, Southampton Water, under the management of Capt. H. W. C. Alger.

The Hythe boats are basically Sunderland Mk.III military transport aircraft, but they have been converted to a well-equipped, comfortable and spacious civil aircraft, with accommodation for twenty-two passengers, sixteen of whom can be berthed at night.

The seating and sleeping arrangements are excellent in the three cabins and lounge on the lower deck and two cabins on the upper deck. There is ample room for movement about the aircraft during flight, and the low sound level in the cabins makes the class highly suitable for the long stages which have to be covered by this line on the routes to Hong Kong, Singapore and to Australia in association with Qantas.

In addition to the passenger load, about 4,800 lb of freight can be carried in four freight holds, and on stages of about 1,000 miles the Hythe is estimated to be a very economical and practical proposition. The true cruising speed is normally about 175 m.p.h., and ultimate range greater than 2,000 miles.

The present frequency of services, six a week, permits a three-day "turn-round" at the end of each return trip, during which time normal maintenance and repairs are done at Hythe. Within half an hour of the passengers alighting at Poole the aircraft is flown to Hythe and within a further twenty minutes of landing there the aircraft is beached and work starts.

The passenger base was moved from Southampton to Poole during the war for security reasons, but it is now the intention to move back to Southampton Docks, where the necessary passenger facilities are being provided at berth 50, which is about two miles across the water from Hythe. This measure is intended to cover the interim period before the construction of a National Marine Airport. The scheme has the advantage of direct railway access and the elimination of the special flights to the maintenance depot.

Capt. Alger is particularly keen to do away with launches for passenger embarkation, and at Poole a pier has been built with two pontoons at the end, into which the flying boats are towed backwards. Similar pontoons are to be constructed at Southampton.

To step straight from the boat on to the shore and then, after the usual formalities, into a nearby train without tedious connecting journeys is the aim of the Corporation.

The *Golden Hind* on the weekly run to Cairo is the only other class of boat being flown in the line until the Solents, twelve of which are on order, come into operation.

CHANNEL ISLANDS CONFERENCE

ON Monday, October 28th, a conference was held in Jersey to consider the application of the Civil Aviation Act, 1946, to the Channel Islands. Sir Frank Newsam and Mr. C. T. H. Morris represented the Home Office, Mr. G. S. Dunnett the Ministry of Civil Aviation, and Sir Harold Hartley and Mr. d'Erlanger represented B.E.A. Authorities from Jersey and Guernsey Islands were present, but Channel Islands Airways were not invited.

The arrangement up to the end of October was for C.I.A. to run normal services as an associate of B.E.A. The Ministry then offered an extension of three months, making it clear to C.I.A. that the arrangement could never be permanent and that eventually, in accordance with policy, the services would be operated exclusively by the Corporation. In the event of C.I.A. refusing the Ministry's invitation, then B.E.A. could consider themselves free to offer employment to the staff of C.I.A. and would do so.

The Ministry of Civil Aviation expressed a wish to consider the possibility of leaving inter-island services, and some services between the islands and the Continent, open to other operators.

There is strong feeling in the Islands on this subject, not merely at the idea of the nationalization of perhaps the most prosperous internal airline company, but of the discourteous treatment meted out to them.

The Islands' Press has referred to the "blackmail methods" and considers the Ministry's suggestion on the inter-island services as "surprising and gratuitous."

K.L.M. PRACTISE G.C.A.

TO practise blind approaches, all K.L.M. pilots are encouraged always to use G.C.A. when coming in to Prestwick. These practice approaches are made regardless of the prevailing weather conditions. The G.C.A. equipment at Prestwick is under the control of the R.A.F. and will probably remain there until next March. It must be some relief to the Ministry of Civil Aviation to know that this blind-approach and air traffic control system is available for the diversion of aircraft unable to land at other airports, and having the necessary range—even though it is R.A.F. equipment operated by R.A.F. personnel.

CIVIL AVIATION NEWS

MORE WEATHER SHIPS

THE meteorological division of P.I.C.A.O., at a recent session held in Montreal, considered the establishment of weather ships in the North Sea and in the Arabian Sea, on a similar system to the thirteen ships which have been proposed for the North Atlantic.

A system of regional radio broadcasts of actual and forecast weather conditions is also being studied. The proposed system would operate from terminals and at points on airline routes, so that aircraft flying anywhere in the region may obtain by radio all the necessary weather information for the flight without calling a ground station. This system would be particularly advantageous in areas with a high traffic density.

It is understood that Brigadier E. R. L. Peake, the British map expert, has arrived in Montreal to take up the position of head of the maps and charts section of P.I.C.A.O.

JET LANCASTRIAN FOR PARIS

DURING the International Aeronautical Exhibition in Paris the Nene Lancastrian will be based on Villacoublay airfield for two days in order to make demonstration flights over Paris.

It is intended that the aircraft will leave London Airport on Sunday, November 17th, carrying Sir Archibald Rowlands, the Permanent Secretary to the Ministry of Supply, Sir Ben Lockspeiser, the Director-General of Scientific Research (Air), Air Marshal Sir Alec Coryton, the Controller of Supplies (Air), Mr. Arthur Woodburn, M.P., Joint Parliamentary Secretary, and Mr. S. Scott-Hall, the Principal Director of Technical Development (Air). The Ministry of Supply are taking part in the exhibition, and the importance to both civil and military aviation of the R.A.E. at Farnborough, and T.R.E., Malvern, will be stressed.

It is understood, also, that the National Gas Turbine Establishment at Rugby, and the projected twenty million pound research station at Bedford, will also receive some publicity. An interesting exhibit will be a 6ft scale model of the arrow-shaped aircraft of the future which is visualized by British scientists.

INTERNATIONAL GLIDING

WHILE the International Olympic Committee has decided that it will not be possible to include a gliding competition in the 1948 Olympic Games, the F.A.I. have decided to hold an international competition under their own rules. The Gliding Committee is now drafting these rules, and the locality and conditions of the competition will be announced early next year. Certainly, such a "free" competition will permit the entry of different types and classes, while under the Olympic Games rules the competitions are restricted to entry by a single type.

CIRCULAR TRIP REBATES

B.E.A. have announced that pre-war facilities for circular trips have been reintroduced. Ten per cent rebates will be allowed on tickets purchased in advance for each section of a complete circular trip starting and finishing at the same place. Passengers may travel on the scheduled services of one or more member-companies of I.A.T.A., and, if wishing to travel between any two points on the circular trip where no air service exists, then the journey may be made by other means of transport. The entire journey must be completed within sixty days to qualify for the rebate.

NEW A.O.A. APPOINTMENT

AMERICAN OVERSEAS AIRLINES have announced the appointment of Mr. J. Stanton Robbins as the new European general manager. Mr. Robbins has been representing A.O.A. at the I.A.T.A. conference in Cairo and was recently elected chairman of the Board of Directors of the Company. Mr. W. Holden White has been appointed director of Public Relations for Europe, with Mr. G. Burdick as his assistant. American Overseas Airlines celebrated the first anniversary of their commercial landplane service to Europe on October 23rd. During the year over 13,000 transatlantic crossings were made and 29,000 pasengers carried. The airline has extended its transatlantic service into Scandinavia, Holland and Germany, in addition to the regular London service. To commemorate the anniversary a bronze plaque has been placed on the wall of the passenger lounge at Marine Terminal, La Guardia, New York.

ANGLO-BRAZILIAN AGREEMENT

THE Governments of the United States of Brazil and the United Kingdom have concluded a bilateral agreement providing for reciprocal facilities in each other's territories for the operation of scheduled air services. The agreement covers the operation of services by designated airlines of both countries, between Europe and South America, and for services connecting Brazil with British Colonial territories in the Caribbean area. Both Governments have expressed their desire to adhere to the principles of the agreement as a suitable basis of approach for a multilateral agreement to govern the operation of scheduled international air services.

BREVITIES

The Swedish Foreign Office have announced that an agreement has been made with the Soviet Government for the re-establishment of a regular service between Moscow and Stockholm. Swedish aircraft will operate from Stockholm to Helsinki, and Soviet aircraft will cover the Helsinki-Moscow route. The service is scheduled to start this month, with three flights a week.

* * *

Cathay Pacific Airways, a British company, are starting a service between Hong Kong and Manila. This is the first British airline to receive authorization to fly into Manila. Australian crews will fly the Dakota aircraft, and the link will provide a direct connection between the Philippines and Great Britain.

* * *

T.C.A. have started a service of eight round trips daily between Vancouver and Victoria, and three round trips daily between Victoria and Seattle. On both these services DC-3 aircraft will be used.

* * *

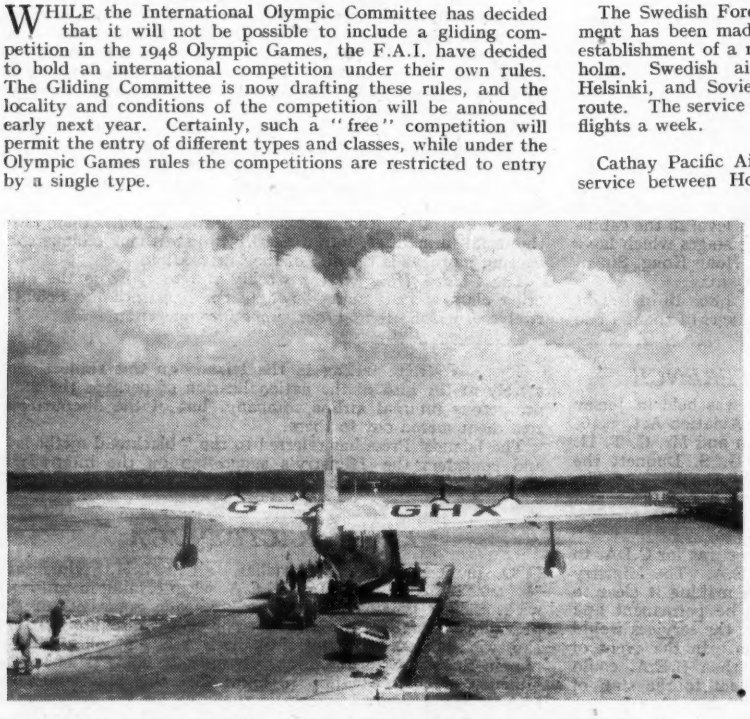
Mr. S. McKiernan has been appointed chief buyer to the supplies branch of British European Airways. With the exception of the last two years, Mr. McKiernan has been actively associated with the aircraft industry since 1929.

* * *

The fifth and last Sandringham flying boat bought by the Dodero Argentine airline company was christened *Paraguay* on October 31st at Belfast. The flying boats are being used on the River Plate service from the Argentine to Uruguay.

* * *

The International Commission for Air Navigation (I.C.A.N.) met in Dublin on October 28th in order to wind up its organization and transfer its functions to P.I.C.A.O.



READY FOR SERVICE: Launching a B.O.A.C. Hythe-class flying boat at Hythe the Corporation's flying-boat maintenance base.

CIVIL AVIATION NEWS

FROM THE CLUBS

THE London Aeroplane Club, operating from Panshanger airfield, Hertford, now has a fleet of three Hornet Moths, two Tiger Moths and one Auster. The Auster and one of the Tigers were allotted by the A.B.A.C. in the usual way, while a third Tiger is due to come into service after overhaul. The comparatively large fleet is useful now that all the flying must be concentrated during a short period of daylight, and that, for the most part, during the week-ends. The Hornets are the most in demand, though there are still enthusiasts who prefer the Tigers, even in the winter. Membership and hours are slowly increasing, and the figure for October might have been a record had the weather during the last week-end been better.

* * *

On Saturday, October 19th, the Strathtay Flying Club was reopened. In spite of poor weather, representatives of the clubs now active in Scotland flew to Scone to attend the opening ceremony—by the Lord Provost of Perth—from the Edinburgh, Loch Leven and the Scottish clubs. The chairman of the Strathtay Flying Club, Major J. R. Cooper, D.S.O., presided. The new club rooms, provided by Airwork, the owners of Scone airfield, are particularly well appointed and include a comfortable lounge, a spacious dining room and a cocktail bar which is of novel design. In addition there are squash courts and tennis courts. At the moment the club has round about 150 members, but it is hoped to increase this number considerably. So far there are two Tiger Moths available.

* * *

Since there is uncertainty about the Scottish Flying Club's future tenure of Renfrew, the committee has been searching for a site from which the club can operate freely. Even if a return to the club's original base is possible, this base is nowadays rather too busy for regular *ab initio* training. Several sites are at present under review. Although the clubhouse is at the moment occupied by airfield officials and by Scottish Airways, parts of it are still available to Scottish Club members. Meanwhile, Mr. R. F. Millen has returned to the club as secretary.

* * *

On November 2nd the Portsmouth Aero Club restarted operations at the City Airport. The charges for both dual instruction and solo flying are, at least for the time being, £3 10s an hour, with two Tiger Moths and a Miles Magister. While the social side remains in the hands of the original Portsmouth Aero Club, flying and maintenance is being organized by the Hunting Group. For the moment there is no clubhouse accommodation, but the premises have recently been derequisitioned and, after redecoration, will be available. Sqn. Ldr. H. Mitchell has resumed the post of C.F.I.

* * *

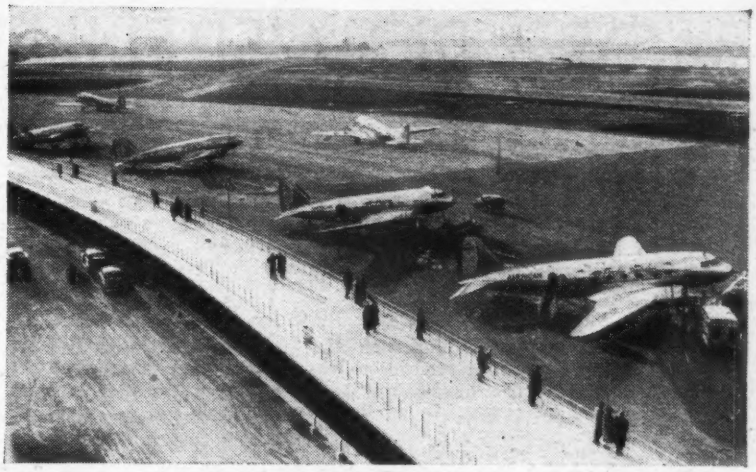
The Middlesex Flying Club, operating from Denham airfield, Bucks, has started operations. The Airwork Flying Club will deal with the necessary aircraft servicing and maintenance, and one of this club's directors, Wing Cdr. Davy, is acting as C.F.I. For the moment the instructional rates are £4 10s an hour, with, later, dual, "A" licence checks and refresher instruction at £4 an hour and solo flying at £2 10s an hour. The club's telephone number is Denham 2100.

* * *

A club known as the West Wales Flying Club has recently been formed in Pembrokeshire, at Withybush, Haverfordwest. The organizer of the club, Mr. R. S. Lockwood, is also running a charter service with the single Auster which is at present in use. Larger aircraft are on order.

* * *

At a special general meeting, the South Coast Flying Club recently agreed on its new committee. The chairman is Mr. Francis Haddock, with Capt. Duncan Davis and Mr. A. Percy Bradley as acting secretaries. It has been agreed that at least one member of the new committee will be present at the club on every evening of the week except Monday.



NEW YORK AIRPORT: Looking from the control tower across the airfield at La Guardia. For a payment of 10 cents the public may watch the activities of the airport from the broadwalk which adjoins the administration building.

WHERE YOU MAY REFUEL

FOR the benefit of private owners and others, below is a complete list—correct to October 28th—of the airfields where aviation spirit is obtainable. The last complete list was published in *Flight* of August 22nd, which can be considered as being "cancelled."

Airfield	Octane No Stocked		Retailer
Balado (Kinross)	87	73	McDonald Aircraft.
Belfast (Sydenham)	..	73	Short & Harland.
Brough	..	73	Blackburn Aircraft.
Broxbourne ..	87	73	Herts & Essex Aviation.
Cambridge ..	..	73	Marshalls Flying School.
Carlisle (Kingstown)	..	73	British Air Transport.
Croydon .. 100	87	73	Petroleum Board.
Denham	87		Bickerton's Aerodromes.
Derby	87	73	Air Schools.
Elmdon	..	73	Midland Aero Club.
Fairoaks	..	73	Universal Flying Services.
Gatwick	87	73	Airports.
Guernsey	..	73	States of Guernsey.
Hanworth	..	73	London Air Syndicate.
Hurn .. 100	87	73	Petroleum Board.
Jersey	87	73	States of Jersey.
Luton	87	73	Luton Corporation.
Lympne	87	73	Field Consolidated.
Macmerry ..	..	73	Edinburgh Flying Club.
Newtownards (N. Ireland) ..	87	73	Miles Aircraft.
Northolt .. 100	87	73	Petroleum Board.
Oxford	87	73	Universal Flying Services.
Perth	87	73	AirWork.
Peterborough ..	..	73	Morrisons Aircraft Services.
Portsmouth ..	87	73	Portsmouth Aviation.
Prestwick .. 100	87	73	Petroleum Board.
Rearsby	..	73	Auster Aircraft.
Renfrew .. 100	87	73	Petroleum Board.
Ringway .. 100	87	73	Ditto.
Ronaldsway (I.o.M.)	87	73	W. H. Kinwig.
Sherburn	87	73	A. H. Wilson.
Shoreham ..	..	73	Brooklands Aviation.
Somerton (I.o.W.)	87	73	Cowes Airport.
Southampton (Eastleigh) ..	87	73	Southampton Corporation.
Speke .. 100	87	73	Petroleum Board.
Sywell	..	73	Brooklands Aviation.
Tollerton	87	73	Tollerton Aircraft Services.
,, ...	87		Nottingham Airport.
Walsall	87	73	Helliwells.
West Hartlepool	87		Northern Air Charter.
Weston-super-Mare	87	73	Western Airways.
Whitchurch 100	87	73	Petroleum Board.
White Waltham ..	87	73	West London Aero Club.
Wolverhampton ..	..	73	Wolverhampton Flying School
Woodley (Reading)	87	73	Miles Aircraft.

MOST POWERFUL HERCULES

Latest Version of Classic Bristol Engine Breaks Into 2,000 h.p. Class

IT is now nearly eleven years since the Bristol Aeroplane Company first introduced the Hercules sleeve-valve air-cooled radial engine, and since that time continuous development has taken place until, to-day, the maximum power output at altitude of the Mk 230, of which details are now released, has been increased over that of the first engine by no less than 50 per cent. Furthermore, this advance has been achieved at the expense of only about 20 per cent increase in weight.

Type-tested and put into production with a take-off rating of 2,000 b.h.p., the Hercules 230 shows an increase of 310 b.h.p. over the previous series, this being obtained on standard 100/130 grade fuel and without water injection. In this connection it is expected that, with the advent of higher grade fuels, the maximum output of this series Hercules—and its successors—will show further substantial increases.

The Hercules has always been famed for its inherent characteristics of high cruising powers coupled with exceptional fuel economy, and these qualities are distinctly emphasized in the latest version. At a maximum continuous weak-mixture power of 1,305 b.h.p., the specific fuel consumption is but 0.428 lb/b.h.p./hr, and this low figure is still further reduced to 0.411 lb/b.h.p./hr at lower powers.

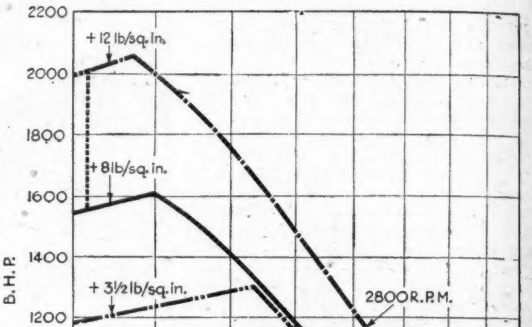
To avoid confusion it should be noted that the recent announcement of Hercules engines with mark numbers in the 630 series does not relate to any major change in either design or performance. It merely refers to engines of the Hercules 130 basic class (i.e., Mk 100 with single-speed supercharger) when used specifically in civil aircraft. This method of distinction—by adding 500 to the basic mark numbers—will be followed for all future civil applications. On this basis the new Mk 230, when supplied for civil aircraft, will be known as the Hercules 730.

Detail Modifications

Important detail improvements in design and construction have been embodied in the latest Hercules. The crankcase has been strengthened and, in addition, has been modified to accommodate main bearings of considerably increased load capacity. Holding-down studs securing the cylinders to the crankcase have been increased in number, and the cylinders themselves have been strengthened and are machined from light-alloy forgings produced by an improved process. Better material is also used for the sleeves and, to round off the picture, the pistons have been made somewhat stiffer.

Perhaps the most important innovation, however, is to be found in the cylinder-head design. This component has, in previous marks of Hercules, been an assembly of two light-alloy castings. In the latest version it consists of a copper base with close-pitch cooling fins, and a steel skirt into which the copper base is secured. The skirt is flanged at the top for attachment of the head to the cylinder barrel, and the bottom surface of the copper base—which forms the flame face "roof" of the combustion chamber—is nickel-plated as an anti-corrosive measure.

The main advantages given by this new cylinder head are that the copper base gives a



Altitude/Power curves for representative running conditions

BRISTOL HERCULES 230

Type: 14-cyl sleeve-valve air-cooled radial with single speed supercharger.

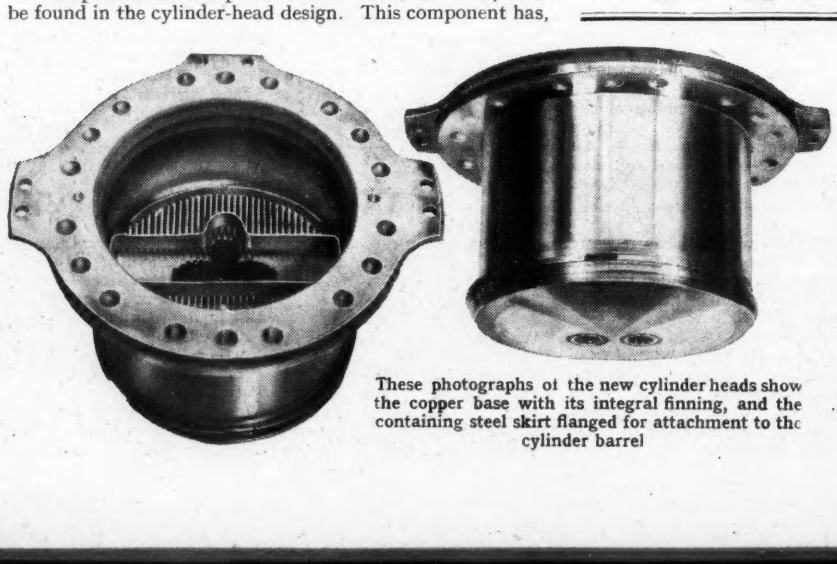
Bore and Stroke	5.75in × 6.5in
Capacity	2,360 cu in (38.7 litres)
Dia. over cyls.	52in
Reduction gear ratio	0.444 : 1
Airscrew shaft size	S.B.A.C. standard No. 6
Rotation	L.H. tractor
Weight (bare, dry)	2,060 lb

Performance

	B.H.P.	R.P.M.	Boost	Altitude
Take-off (5 min limit)	2000	2800	12 lb	S.L.
Max. emergency (5 min)	2055	2800	12 lb	3,500
Max. continuous (R.M.)	1605	2400	8 lb	4,700
" " (W.M.)	1305	2400	3½lb	11,400

Consumptions (Weak Mixture)

B.H.P.	R.P.M.	FUEL b/b.h.p./hr	OIL (gall/hr) Max.	Average
1305	2400	0.428	2.0	1.0
760	1400	0.411	0.7	0.35



These photographs of the new cylinder heads show the copper base with its integral finning, and the containing steel skirt flanged for attachment to the cylinder barrel

The main advantages given by this new cylinder head are that the copper base gives a

very much better degree of heat conductivity from the flame face and, at the same time, the steel skirt enables an enhanced entry and exit to be provided for the cooling air. In addition to these qualities the form of construction also affords a high degree of strength and stiffness.

Improvement obtained in engine cooling is indicated by the fact that, in comparison with the previous light-alloy type, the new heads run some 25 deg C cooler for a given boost and cooling-air pressure drop. Alternatively the cooling-air pressure drop can be halved for a given boost and head temperature. As a consequence to this development, the maximum boost which can be used within safe limits, without incurring any penalty in cooling drag, has been very considerably increased.

It is claimed by the manufacturers that the test results already achieved indicate clearly that the new Hercules 230 has ample scope for further developments. It is also felt that this engine will be able to take full advantage of the new higher-grade fuels, and the target of 2,500 b.h.p. for operational use, with lower fuel consumption figures than those currently offered, is a realistic one, having in fact already been achieved on the test bed.

This latest version of the Hercules—and its variants—is, of course, available as a complete power plant of the latest Bristol low-drag design, which, in addition to its excellent aerodynamic qualities, embodies a number of practical advantages in accessibility and convenience for servicing.

French Exhibits at the Paris Show

UNDER the heading of "What we shall see at the 17th Salon de l'Aviation" our French contemporary *Les Ailes* has in recent issues discussed the probable exhibits of the French aircraft firms which will be represented at the forthcoming Paris Exhibition. It forecasts that a large section will be devoted to jet-propulsion, and that many firms will exhibit their products in model or mock-up form. It is pointed out that several well-known manufacturers, some of whom were pioneers of aviation, will no longer be found, and that there will be many newcomers. Of the French pioneer firms Louis Bréguet and Morane-Saulnier alone remain in being.

The very considerable cost involved in exhibiting is responsible for the absence of some of the smaller independent firms, both old and new. The four remaining nationalized concerns will be represented adequately. The 17th Salon will not be a commercial show in the ordinary sense, as the majority of exhibits will not be for sale. It will, therefore, be chiefly an exhibition of technical and scientific value.

For the duration of the exhibition, examples of a variety of aircraft, British and French, will be made available for demonstration and examination at airfields near Paris.

Of the original six State-owned *Sociétés Nationales*, the S.N.C.A. de l'Ouest and the S.N.C.A. du Midi were absorbed early in the war by S.N.C.A. du Sud-Ouest and de Sud-Est respectively.

According to *Les Ailes*, the companies and products to be shown are as follows:—

S.N.C.A. du Centre

This firm will exhibit, either complete or in model form, the 40-ton NC-211 transport plane, which will be one of the largest aircraft at the Salon, the NC-2.001 helicopter which is claimed to be extremely fast and has contra-rotating two-bladed coupled rotors; the three/four-seater NC-840; the NC-271, which is an interesting and very fast two-jet bomber; and the twin-engined NC-702 Siebel.

S.N.C.A. du Sud-Est

The exhibits of this company will include sections of the large SE-1.010 and 2.010; the SE-3.000 helicopters; the SE-2.300 touring plane and the tailless SE-2.100. A model of the Bloch 161 "Languedoc" will also be shown (examples of this machine already in use by Air France are at present being fitted with full deicing equipment and cabin heaters).

S.N.C.A. Sud-Ouest

There will be three twin-engined transport 'planes, the SO-30R, -90, and -7.010, among this company's exhibits. The SO-30R is a 30-passenger transport, of which the first of 30 is now being constructed. The SO-7.010 is a small twin-engined aircraft with a somewhat novel fuselage construction, which is described literally as a "resistance chassis" to which may be fitted variations of fuselage according to whether the aircraft is to be used for communications, ambulance, postal or other work. As a feeder-line type it will carry six passengers and has a range of about 1,000 miles. In addition, a small helicopter and two jet prototypes, the So-4.000 and SO-6.000, will be shown. The SO-4.000 high-speed bomber is built to carry a 5-ton load for 2,000 miles. The engines are two Hispano turbo-jets built under Rolls-Royce licence. The SO-600, which is said to have an all-up weight of about 8,500 lb, is still in an experimental stage, and provision is made for the fitting of either Junkers Jumo, Rateau, or Rolls-Royce Nene or Derwent gas turbines.

S.N.C.A. du Nord

Light private-owner types will predominate on this company's stand, although the N-1.500 torpedo-bomber will be present. This machine has two 1,600 h.p. Gnome-Rhône engines and is intended also for use as a dive bomber operating from an aircraft carrier. In addition there will be the four-seater N-1.101, which is well suited for taxi work, the three-seater N-1.200 (*Nordecrin*), and the Caudron C-800 two-seater training glider.

Société Industrielle Pour L'aeronautique (S.I.P.A.)

Three prototypes will be shown by the firm, namely, the S-20 4-passenger private-owner type fitted with a 145 h.p. engine, the S-50 with a similar engine but designed as a two-seater trainer, and the small twin-engined S-70 for air taxi work.

Morane-Saulnier

Another firm to show three new types, this company will be represented by the MS-472 and MS-560 for training purposes, and the MS-571 private-owner type.

It is learned that among other aircraft to be exhibited will be: the Max Holste 52 all-metal two-seat trainer with tricycle undercarriage; the Courlis S.U.C.10 high-wing metal four-seater which is an S.C.E.A.N. product; the Guerchais-Roche two-seater trainer; the G.R.-30 with modified Ford V-8 engine; the G.R.-35 with 140 h.p. Bengali engine; la Courneuve P-107 single-seat glider. Interesting possible exhibits are the Saville-designed SO-1.100 gyroplane, which is said to employ jet propulsion, and the small M.S.-650, which is being produced by collaboration between manufacturers and private owners. A number of the aircraft mentioned in this forecast have already been discussed in *Flight* of May 23rd and Sept. 5th, 1946.

BLACKBURN DEVELOPMENTS

A NEW aircraft and two larger Cirrus engines of 180 h.p. and 300 h.p., the prototypes of which will soon be ready, were mentioned by Mr. Robert Blackburn, chairman and joint managing director of Blackburn Aircraft, Ltd., when he presided at the firm's eleventh annual general meeting last week

He was reviewing current production and said that at the Brough factory where the very much reduced Firebrand programme was nearing completion, the engine department had steadily expanded and production of the 100 h.p. Cirrus Minor and 155 h.p. Major engines had been resumed on a considerable scale. When the Firebrand programme was completed they expected to be engaged on production of the Percival Prentice trainer. Their flying training school at Brough was, like others of its kind, operating on a reduced scale, but there were signs of increasing activity in the near future. The firm's Clyde factory was fully occupied with the production of aluminium houses.

In the development sphere, Mr. Blackburn said they were engaged on the design of an entirely new gas turbine aircraft for the Navy, and other even more advanced types were in the project stage.

ROLLS-ROYCE FUEL CONSUMPTIONS

FOLLOWING recent tests, some revised fuel consumption figures have been issued by the Rolls-Royce company for the Merlin 620 and Griffon 74 engines. These latest figures are as follows:—

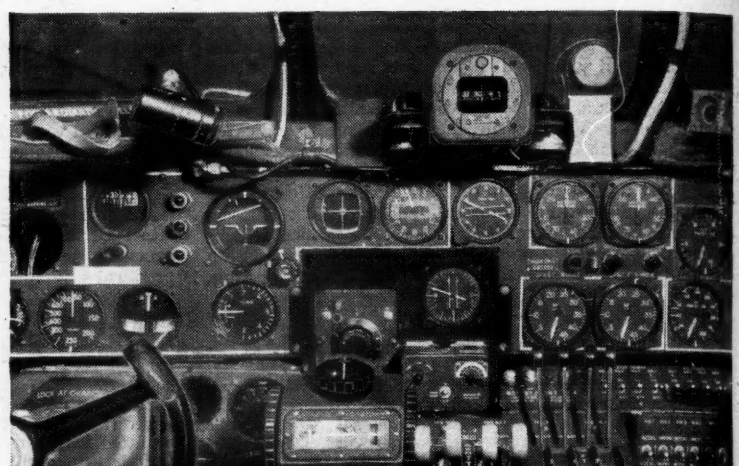
WEAK MIXTURE CRUISING CONDITIONS

Engine	b.h.p.	r.p.m.	Alt.	Consumption
Merlin 620				
M.S. Gear ..	1,160	2,650	10,000	0.45 lb/b.h.p/hr
F.S. Gear ..	1,160	2,850	23,000	0.51 lb/b.h.p/hr
Griffon 74				
M.S. Gear ..	1,310	2,400	7,500	0.50 lb/b.h.p/hr
F.S. Gear ..	1,250	2,400	19,000	0.52 lb/b.h.p/hr

Blind-Approach Problems

Second Part of R.Ae.S. Lecture by Mr. H. C. Pritchard, B.A. : Some Suggestions : The Discussion

(Continued from page 474)



The A.12 automatic pilot as installed in an R.A.F. Liberator. This has been successfully modified in America for automatic approach work.

IN the first half of his lecture, which was summarized in last week's issue, Mr. H. C. Pritchard described present-day blind-approach systems and also one of the latest types of automatic pilot. He then continued to describe some preliminary experimental work on automatic approach using the SCS.51 system in conjunction with a conventional automatic pilot. In this, the runway localizer signal was introduced to the automatic pilot to cause a proportional rate of turn. Such a system, however, produced an unstable approach. This could be cured by introducing means of using the difference between the known runway direction and the aircraft heading as given by the directional gyro.

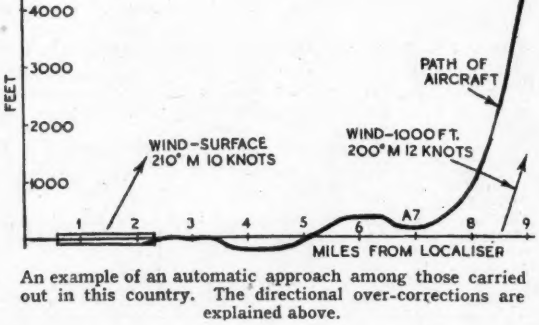
A typical approach with automatic control is shown below in diagrammatic plan form. In this the aircraft turned rapidly on to the centre-line until, at the point "A," the engines were throttled The drift angle was about 4 deg. The northward departure of the aircraft after starting the glide was due to change of rudder trim when the engines of the Lancaster were throttled back, but the deviations were ironed out before the runway was reached.

Consideration of a number of experiments showed that high gearing in an automatic pilot was required to give precise stabilization, and that large variations of cross-wind might prove to be the limiting factor with the particular system used in the experiments.

Mr. Pritchard thought that the use of the aircraft heading as a measure of approach to the beam might be superseded by one derived from the beam itself. Given some measure of the range from the localizer, the distance from the runway centre-line could be derived from the signal, and differentiation in relation to the time factor would provide a rate of approach. With such a system the errors arising from variations of cross-wind should be minimized.

The problems of automatic vertical guidance seemed, he thought, to be somewhat easier, largely because the aerodynamic damping in pitch was usually better than that in yaw.

Mr. Pritchard made it clear that much experimental work



An example of an automatic approach among those carried out in this country. The directional over-corrections are explained above.

with different aircraft types and with variations of flap setting would be required before any final type of automatic control could be established.

So far the lecturer had dealt with methods of fixing the aircraft's position during the approach, but the urgency was far greater during the final landing stages. He observed that conditions of zero visibility were somewhat exceptional even in this country, but that since in the South of England the incidence of a 600ft ceiling was four times as frequent as that of a 150ft ceiling, the possibility of merely reducing the safe operating ceiling would not go a long way towards eliminating cancellations. In American operations bad terminal visibility accounted for 70 per cent of the cancelled flights.

Accurate Position-fixing

Any final choice of a position-fixing system would undoubtedly be influenced by aircraft control requirements. The conception of a fixed glide path meeting the runway at a particular point was not attractive for blind landings. Another suggestion was that the aircraft should be controlled on the fixed glide path down to a particular height, after which vertical control would be taken over by gyroscopic means so as to flatten out the path. Such a system would be distinctly critical and was not inherently reliable; it had, however, been used in pilotless aircraft work.

Another idea was that the height of the aircraft above the runway level should be measured continuously and smoothly, and that primary control should depend on this measurement. The most promising means of obtaining this result was by means of some form of radio altimeter. Those so far used were accurate only to within 10ft, but a substantial improvement could no doubt be obtained with developments in centimetre valve technique. There was one difficulty—that the ground on the approach was often far from level and it would be necessary to apply corrections. In German experiments it had been found that the height of the aircraft varied exponentially with the time of touch-down, and the Fu.G.101 radio altimeter was arranged so that no current flowed when the resultant equation was satisfied. The pilot, consequently, merely maintained the needle of the instrument against a fixed mark, and this technique theoretically provided an accurate glide path to the ground.

The use of centimetric wavelengths made it possible to produce very narrow beams and the accuracy obtained might go a long way towards removing the reflection difficulties. Since a 3-centimetre radiation could be directed within an accuracy of plus or minus 0.5 deg and a 1 deg obstruction angle was normally specified for runways, there should be immunity from reflection troubles. If the localizer radiation could be kept above this minimum angle and restricted in the horizontal plane, with both transmitting aerials in one place, an attractive approach scheme would be presented. Precise short-range navigation would, however, be required, since the coverage

BLIND-APPROACH PROBLEMS

of the beam at a range of ten miles would be only two miles. Furthermore, reflection was somewhat greater at small wavelengths, so a well-designed system would be essential. The rate of landing might be restricted by the fact that the presence of another aircraft on the approach would spoil the indications for the following aircraft.

The use of a "leader" cable, which created a magnetic field, had often been proposed. The magnitude of the current induced also gave a measure of relative height, but if the aircraft was off the centre line erroneous height information was provided. The scheme, therefore, was limited to use for horizontal guidance, but the practical cable-running problems appeared to prohibit the scheme.

There were undoubtedly spectacular possibilities in the use of microwave radar scanners, which offer the crew an actual picture of the ground ahead or below. But while very short waves would give good definition there might be serious scattering and attenuation under certain atmospheric conditions. The weight of the equipment was, too, somewhat prohibitive.

Mr. Pritchard did not think that the blind-landing problems would be solved, from the position-fixing point of view, by beam or ground-control systems such as had been used for blind approach. Nevertheless, a centrimetric beam system might lead to an appreciable and worthwhile advance for approach purposes. In the meantime, the provision of adequate information for vertical guidance presented the greatest difficulty, and some form of radio altimeter seemed to be the most promising possible solution. Finally, the use of automatic controls, to assist the human pilot in keeping the aircraft on the approach track, should ease his task considerably.

The Discussion

Mr. W. G. A. Perring thought that blind approach was merely part of the bigger problem of control, and that the ideal would involve planning, within a radius of 200 miles, the arrival of each aircraft at the right time. G.C.A. seemed to him to be attractive for use both in long- and short-distance control. He mentioned, however, the need for international standardization.

On the subject of relative checking or hold-off heights, Mr. M. B. Morgan gave some calculated figures which showed that aircraft all-up weight made very little difference. With a wing loading of 30 lb/sq ft, and at an approach speed of 104 m.p.h., correct checking heights varied only between 18.5ft at an all-up weight of 6,000 lb, and 26ft at an all-up weight of 500,000 lb. At 60 lb/sq ft and a speed of 147 m.p.h., checking would need to be started at 37ft with a 6,000 lb aircraft; at 40ft for 20,000 lb; at 43ft for 60,000 lb; at 47ft for 150,000 lb; and at 52ft for a 500,000 lb aircraft. He thought that the drift-landing problems were very considerable and that too much had to be done at the last moment. For this reason, amongst others, he strongly favoured the idea that scientists should have as much flying experience as possible.

Wing Cdr. E. E. Vielle thought that the days of the "guessed" approach should be over as soon as possible, and that too much judgment was required of the pilot with present-day aircraft. For this reason he suggested that instrument approaches and landings were as necessary in good weather as in bad weather if accuracy was to be maintained. The use of sector lighting certinly improved the pilot's judgment of height and distance. He had tried automatic throttles in America and liked them once he had got used to them. He suggested a variable glide-path beam to suit wind conditions. Given a scientifically controlled approach landing was merely a matter of changing the aircraft's attitude.

Mr. F. W. Meredith did not think that increasing aircraft size would present any additional difficulties. He agreed that the presence of a cross-wind very greatly added to the pilot's problems and suggested the use of some form of castoring undercarriage. He thought that the throttle should be used to vary height rather than speed, and that the automatic glide-path corrections should be made on the throttles. He insisted that bad-weather approach aids should be used only for emergency and not in an attempt to increase schedule regularity.

Mr. R. W. Taylor did not think that greater accuracy could be obtained by using shorter wavelengths in beam transmissions, since there was less distortion with longer wavelengths. The effect of a variable glide-path to suit wind conditions could be obtained by mathematical means on a "time-to-go" basis, and he suggested the use of a barometric altimeter for the first part of the approach and a radio altimeter as a guidance for the last 100ft.

Mr. E. T. Jones provided an ingenious contribution to the problem by suggesting that the approach should be made by someone in a form of synthetic trainer, his movements in which would be recorded and transmitted to the actual aircraft. The synthetic pilot would make his approach in a rectangular "tank" representing the real glide path, and his corrective movements would merely be repeated.

Air Comdre. Frazer also thought that any systems for blind approach should be used in normally good weather before any attempt was made to apply them regularly in bad conditions. It was a curious fact that for the most difficult task of all—making an instrument approach—crews had the least practice. If an instrument approach technique was used all the time, then it would become quite normal and easy. One of the major difficulties concerned the switching of attention from one form of indication to another.

Mr. W. J. Richards considered that the final solution was undoubtedly that of automatic control, which could be used for all approaches in good weather or bad. He thought that efforts to perfect blind-approach systems should not be prejudiced by too great attention to the final landing problems. As far as radio aids were concerned, he believed that the crew of the aircraft should be in primary control of the situation.

Mr. I. Bowen, unlike previous speakers, believed that equipment should be devised and used so that aircraft could always fly in bad weather so as to offer 100 per cent travelling regularity. He pointed out that the Smith electric automaic pilot had been designed especially to be used in conjunction with blind-approach aids.

Mr. N. E. Rowe thought it was important that a decision should be reached as to whether the aircraft crew or ground personnel should be in charge of the navigation and approach situation. He thought that the equipment should be arranged to follow trends in aircraft design, and that the latter should be considered from the blind-approach standpoint—particularly where large changes of trim in different conditions were concerned.

RESISTANCE OF STAINLESS STEEL TO MARINE ATMOSPHERE

THE Metallurgy Division of the U.S. National Bureau of Standards has completed a long-term investigation of the resistance of thin, stainless steel sheets for use in aircraft exposed to marine atmospheres or wetted frequently by sea-water. Samples of 0.018in sheet were exposed to the weather and intermittently or continuously immersed in sea-water at three different locations and were removed for examination after periods of six, twelve, twenty-four and thirty-six months. The damage suffered from corrosion was evaluated by visual examination and flexural fatigue tests.

The investigation disclosed that the rate of corrosion is most rapid during the first six months of exposure, and thereafter the rate is much slower. After three years' exposure most of the samples failed in fatigue tests at from 78 to 85 per cent of their initial endurance limits. Of steels containing approximately 18 per cent chromium and 8 per cent nickel, those having from 2.5 to 3.5 per cent of molybdenum, were much less susceptible to rusting or weathering than those containing titanium, columbium or having no stabilizing elements. Shot-welds were slightly more susceptible to rust than the rest of the sheet. Improvements in the degree of surface polish was found to decrease the amount of rust, and pickling, prior to passivation, to increase the resistance to corrosion.

None of the steels rusted appreciably when immersed in sea-water. Aluminium, and particularly magnesium alloys were rapidly corroded, however, when exposed in contact with the stainless steels

FORTHCOMING EVENTS

Nov. 9th.—Helicopter Association of Great Britain: "Helicopter Research and Development," Mr. C. G. Pullin; Manson House, 26, Portland Place, London, W.1.

Nov. 9th.—R.Ae.S., Graduate and Student Section: Visit to Percival Aircraft and Napiers, Luton.

Nov. 12th.—R.Ae.S., Belfast branch: "Future Development of Aircraft for Civil Aviation," N. A. White; College of Technology.

Nov. 13th.—Royal United Services Institution: "The Radio War," A. V-M. E. B. Addison.

Nov. 13th.—R.Ae.S., Southampton: "Air Transport Operation," E. Brook Williams, B.O.A.C.

Nov. 14th.—R.Ae.S., Birmingham: "Some Problems of High Speed Flight"; Dr. S. C. Redshaw.

Nov. 14th.—R.Ae.S., London: Full-day discussion on Engineering Problems of Future Aircraft."

CORRESPONDENCE

The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

SHOCK WAVES

Vibration and "Silver Grey Clouds"

ARE shock waves not due to a critical period in the vibration of the wing structure? Careful design in conjunction with the study of an electronic vibration record would result in a structure capable of withstanding the resultant vibration at the particular speed at which the vibration of the wing becomes visible as a "silver grey cloud."

It is presumed that electronic vibration recorders are available in this country. W. R. DAINTY (CAPT.).

THE "LUTON MINOR"

In Search of a C. of A.

I HAVE been trying for some time to get in touch with people who are building, or have built, "Luton Minor" light aircraft, with a view to a concerted attempt to get this type approved for C. of A., as the possibility of "Permits to Fly" being issued again appears pretty remote.

I feel that it is by no means impossible for an amateur to obtain a C. of A. for this aircraft provided he uses only approved materials and arranges for inspection by a qualified inspector during construction. For simplicity and performance with, say, 35-40 h.p., I consider that this type will take a lot of beating.

Would anyone interested please write and let me have their views? They would be most welcome. E. J. POPE.

LORD TEDDER'S WARNING

Overseas Service and Pay Queries

THE reply by Air Chief Marshal Sir Philip Joubert (*Flight*, October 17th), to my letter of October 3rd, shows that the Air Ministry is keeping a watchful eye on public opinion, which is a commendable course in the present state of affairs.

His replies to the points raised were very satisfactory, but I observe that the point regarding overseas service was discreetly ignored. There is a further problem arising from this, which is likely to cause some serious thinking among the regulars. It is accepted that the term of service for those who are conscripted will be of comparatively short duration. If this is so, it would seem that they will not be sent overseas, since the first six months' service will be required for training, and the volume of trooping would rise above the capacity of shipping space available if they are only drafted for short periods. The regular airmen will presumably thus provide the manpower for overseas commands, while the conscripted men serve on Home Establishment only.

I would like to raise a further point regarding the new rates of pay. There has been wide publicity on these new rates, but how much have the public been told of the decision to make the marriage allowance subject to income tax? This will almost wipe off the increase in pay, and is an excellent example of giving with one hand, and taking away with the other. It would be interesting to know the "actual" gain in income, compared with the figures given to the Press.

PER ARDUA AD ASBESTOS.

"Shabby Treatment" of the A.T.C.

MAY I be allowed to express my complete agreement with the points mentioned by an ex-A.T.C. Instructor in his letter published in *Flight*, September 26th?

One of the reasons the R.A.F. finds itself in such an acute manpower position is due partly to the apparent lack of concern the Air Ministry displays with regard to the future of A.T.C. cadets when due for call-up for the armed forces.

Towards the close of hostilities many cadets were placed in the Army, which was quite contrary to the principles laid down. The excuse offered was that the best possible use of manpower was essential.

This policy was excusable to a certain extent, but could have been avoided had the Air Ministry given priority only to the A.T.C. as far as the Air Force was concerned. On the contrary, however, they accepted people who had little or no interest in the R.A.F., thus filling vacancies that could have been put to better use by keen, semi-skilled candidates.

Besides being a waste of taxpayers' money, the effect on the cadets concerned was to leave a feeling of bitterness and disappointment at such shabby treatment.

In May the Army Council published an instruction whereby ex-A.T.C. personnel could transfer to their parent service under the conditions laid down. Obviously I lost no time in applying, as I am still as keen on the R.A.F. after nearly two years in the Army. Shortly after, the War Office agreed to release me providing the R.A.F. found me medically fit and suitable. That was nearly six months ago. I am still in the Army awaiting the decision of the Air Ministry as to whether I am fit and suitable—whatever that may mean! Such delay is hardly encouraging, yet at the same time they are appealing for men to join for regular service.

When will the authority concerned realize that a *keen* airman is of more advantage than a *dissatisfied* soldier?

Ex-A.T.C. CADET N.C.O.

FREIGHT

Its Meaning in Maritime Circles

IT is very common nowadays for the word "freight" to be used when what is meant is "cargo" or "goods carried." The word "freight" is a maritime term and means the money paid for the transportation of cargo; it does not mean the cargo itself.

This is quite clear to anyone in the shipping world and it seems to me a pity that the word should be wrongly used in air transport. H. R. GILLMAN.

[According to the Concise Oxford Dictionary it can mean either.—ED.]

"WHY 'CENTRIFUGAL' FORCE?"

To Flee, or to be Flung?

IN the article upon the use of the term centrifugal force in *Flight*, October 10th, on page 404, the author states that the confusion arising from the term begins at the derivation. This is not surprising if he derives it from the Latin *fugio*—"fling."

According to my information, the root *fug*, like the Greek φευγ, conveys the idea of escape or flight. The noun *fuga* means "flight or escape" and the two verbs *fugo* and *fugio* being respectively transitive and intransitive, mean "to put to flight" and to "flee."

As the writer has chosen *fugio*, the word by derivation means "fleeing from the centre," which is much more reasonable, as this does not mean that the body concerned is being flung out.

I do not think therefore that the word is a misnomer, and I think it is fairly obvious that a body will not move in a circle according to Newton's Law, and that a force is necessary to change the direction of the velocity.

C. N. HUDSON.

"STYLED" AIRCRAFT

Psychological Effect of Good Design

THE caption under the picture of the "Stinson Interior" in your issue of October 17th, suggesting that aircraft are *suffering* from the attentions of the styling experts, implies that cleaning up the "office" is a retrogressive step.

The psychological effect on the general public of a finished design as against the average British layout of parts, apparently stuck here and there as an afterthought, will have a great bearing on the progress of aviation as a travelling medium.

A similar effect is seen in the abhorrence of the public of motor cycles as against two-seater cars. The former, with its engine parts and transmission exposed, looks dangerous, and no amount of dragooning will persuade "Aunt Fanny" to ride on one, whilst she would delight in the thrill of a ride in a two-seater car. To a motor cycle enthusiast, however, there is no comparison.

The same thing applies with flying, particularly private flying, which is held together with enthusiasm for flight instead of as a means of travel. A good-looking interior designed as a comfortable unit will reap its own reward for air travel.

C. R. WISEMAN.

FINAL CHECK: Aircrew check equipment and stores before boarding their Avro Lincoln for the long flight to Santiago, Chile. As described on this page, three Lincolns are making the trip.

SERVICE AVIATION

Royal Air Force and Naval Aviation News and Announcements

R.U.S.I. Lecture

AT the Royal United Service Institution in Whitehall on Wednesday, November 13th, at 3 p.m., Air Vice-Marshal E. B. Addison, C.B., C.B.E., will lecture on "The Radio War." The chair will be taken by Air Marshal Sir James M. Robb, K.B.E., C.B., D.S.O., D.F.C., A.F.C.

Lincolns to Chile

THREE Avro Lincoln bombers of R.A.F. Bomber Command which would have gone to Okinawa, in the Pacific, as part of Tiger Force, for the attack on Japan, set off on October 25th on the first stage of an 8,000-mile flight which *will*, as it happens, take them to the Pacific. Their mission is to attend the inaugural celebration of Chile's new President.

After inspection by the A.O.C.-in-C. Bomber Command, Air Marshal Sir Norman Bottomley, and the A.O.C. No. 1 Group, Air Vice-Marshal R. S. Blucke, they flew from R.A.F. Station Scampton to St. Mawgan, which they left the following Sunday for Rabat Sale (1,240 miles), Bathurst (1,550), Natal (1,880), Rio de Janeiro (1,285), Montevideo (1,150) and (over the 23,000ft Andes) San Diego (865).

The C.-in-C. said this was the first time Bomber Command would have crossed the Andes, and the first time Lincoln aircraft would have visited America. The flight was a good-will mission to the people of Chile and to their new President and Bomber Command was naturally very proud to have been given the task. Some of the crews had operational experience and some would have gone with Tiger Force had the Japanese not collapsed.

The aircraft, which will maintain visual contact throughout the flight, were due at San Diego on November 2nd. They will stay in Chile for nine days and return by the same route.

Head of the mission is Officer Commanding R.A.F. Station Scampton, Grp. Capt. C. R. D. L. Lloyd, O.B.E., aged 35, who was born in London and educated at Hurstpierpoint College, Sussex, and R.A.F. College, Cranwell. He went to Canada in 1940 on loan to the R.C.A.F. and became Officer Commanding the Canadian Air Armament School.

In operational control of the flight is Wing Cdr. G. J. Bell, a Canadian, Officer Commanding No. 100 Squadron based at Lindholme, Yorks. The captain of his aircraft is Sqn. Ldr. D. B. Bretherton, D.F.C., and the other two captains, both based at Coningsby, are Flt. Lt. D. H. Shorter, D.F.C. and Bar (No. 97 Squadron) and Flt. Lt. F. H. E. Watts, D.F.C. and Bar (No. 83 Squadron), who took part in the sinking of the German battleship *Tirpitz*.

Each aircraft has an aircrew of seven and a ground crew of seven; 44 personnel in all are making the flight. The Medical Officer, F/O. A. C. Kennedy, is making his first long-distance flight in an aircraft. He was until recently on the staff of Glasgow Royal Infirmary.

During the war three Victoria Crosses were won from R.A.F. Station Scampton—by Wing Cdr. Guy Gibson, Flt. Lt. R. A. B. Learoyd, and Sergt. Hannah.

"Mercury" in New Zealand

THE Halifax *Mercury* of the Empire Radio School arrived at Okahea, New Zealand, from Sydney on November 23rd.

First Post-war Cadets for Cranwell

THE first post-war entry of cadets to the R.A.F. College, Cranwell, for Permanent Commissions in the General Duties Branch, has been made. These cadets, who began training last month (and in January, 1947) were selected in a modified competition held this summer. Most of the successful candidates were members of the A.T.C.

They will be enlisted and paid as airmen and will pay no fees at the College. On successful completion of the course, lasting about 2½ years, they will be appointed to Permanent Commissions in the General Duties Branch.

In addition to normal flying training, cadets receive educational and general

SERVICE AVIATION

service training. On graduating they should have reached the standard of the second year's work for University pass degree and should be qualified as pilots and in navigation.

Future entries to Permanent Commissions in the General Duties, Equipment, Secretarial and R.A.F. Regiment Branches will be by competitive examination which will be held in June and December of each year. Full particulars of the competition can be obtained from Air Ministry (A.R.1) or from the Civil Service Commissioners.

A.T.C. Cadets Get R.A.F. Concession

A.T.C. Cadets who hold the A.T.C. proficiency certificate will in future undergo shortened periods of primary training on joining the R.A.F. The shortened periods of training will be as follows:—

(a) Ex-cadets entering for regular service will be given eight weeks instead of 13 weeks and National Service Entrants six instead of eight weeks' primary training at recruit centres.

(b) Authority will be issued for ex-cadets to be allowed to wear their A.T.C. Proficiency Badges in R.A.F. uniform while undergoing Recruit Training Courses.

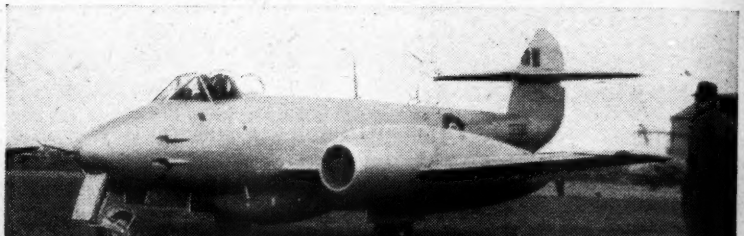
(c) Airmen wearing the A.T.C. Proficiency Badge are not to be retained as drill instructors unless they volunteer for this duty.

This means that the R.A.F. recognizes in a concrete and substantial way the voluntary training carried out by the A.T.C.

Skilled Employment

TO help ex-members of the R.A.F. and W.A.A.F. to obtain skilled civilian employment the Air Ministry has arranged to provide additional information on the certificates of service issued to airmen and airwomen. This will give full details of the period spent in the Service trade in which they were employed at the time of release and also particulars of any previous trades.

Ex-airmen and ex-airwomen can have this useful information added to their certificates (Form 1394, 2520/11 or 2520/11W) if they will send them to the Air Officer-in-Charge of Records, B.4 Section, Ruislip, Middlesex, in the case of discharged personnel, and to A.O.C. Records, K.2 Section, Gloucester, in the case of released personnel.



CLIPPED BUT EXTENDED : A Gloster Meteor IV (twin Rolls-Royce Derwent Vs) with short-span wing and ventral auxiliary fuel tank for increased range. The machine is seen at Farnborough, whence Sqn. Ldr. D. V. Cotes-Preedy, D.S.O., flew it to France, as recorded on page 492.

New Spearfish, and Halifax Conversions

THE first production-type Fairey Spearfish torpedo/dive-bomber aircraft (Bristol Centaurus) for the Royal Navy is nearly complete at the Heaton Chapel works of the Fairey Aviation Co., Ltd. It was at this factory that hundreds of Battles, Fulmars and Barracudas were built. The works are also engaged in converting 64 Halifax bombers into freight and paratroop aircraft.

Technical interest in the Halifax conversion work lies in the fact that the revised and modified aircraft embodies more than 54 modifications to the airframe and more than 40 to the Bristol Hercules XVI engines; all this work being undertaken by Fairey operatives. In the fuselage, on the belly and astern of the bomb doors, one of the biggest exit hatches for paratroopers yet to be made has been fitted. Special attention has been paid to fire precautions; each engine now has built-in behind it a set of three fire extinguishers, whilst all electrical cables and fuel pipe leads have been given a flame-proof covering.

A fully controlled air intake—a major installation—has also been introduced, the control being in the cabin and not operated by the pilot. To cope with tropical conditions, full tropicalization of airframe and engines has been made, including installation of sun-blinds, larger wheels and brake units.

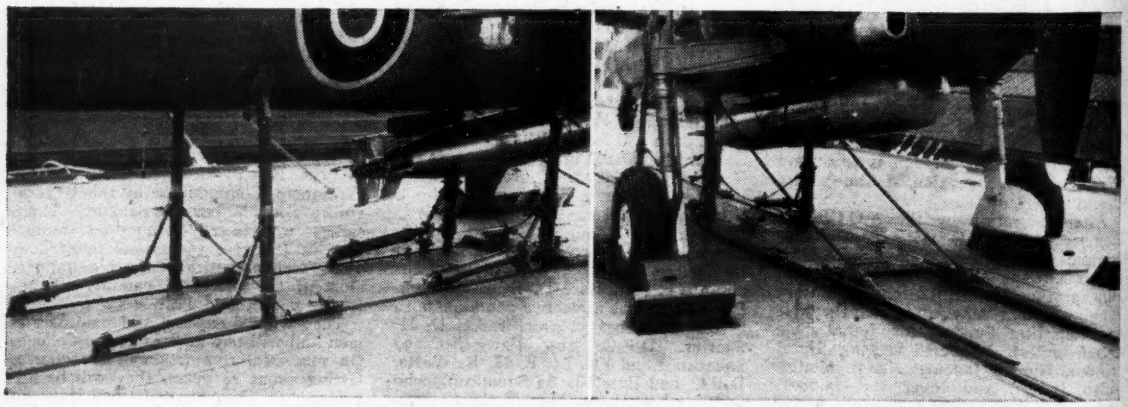
Sixty-five Halifaxes, ex Maintenance Units, are undergoing this conversion, whilst 336 Hercules XVI engines are being modified and given top overhaul. These engines include those extracted from the Halifax bombers flown in to Ringway and a number of basic power-plants supplied direct from M.U.s, etc.

In addition, 2,000 Halifax control surfaces (200 aircraft sets of ailerons, elevators, flaps and rudders) are undergoing modification, in particular to their covering.

U.S. of S. Addresses Youth

MR. GEOFFREY DE FREITAS, M.P., Under Secretary of State for Air, speaking at the Mansfield Youth Club at Westfield House, Mansfield, Notts, last Sunday week, said:—

"We are a fortunate people. We have never suffered from militarism. Our Armed Forces have always known that they were the servants of the State and that they were responsible to the Government of the day, which had been freely elected by the people. This is a democratic age and as servants of a democratic State, members



HELPING HAND : The claw-like fittings which engage spools on the fuselage are clearly visible in the left-hand of these two views of a torpedo-laden Barracuda on the accelerator of H.M.S. *Theseus*.

SERVICE AVIATION

of the Armed Forces have an honourable duty to perform.

"I can understand that the Royal Air Force, as the youngest of the Services should have a special appeal to the enterprising young men of today. We want keen young men to volunteer. We have over one hundred interesting trades to choose from and with each of them go two priceless assets; pride of service and comradeship."

514 R.A.F. Squadron Reunion

A REUNION of 514 R.A.F. Squadron is to be held in London on a date in February next year. All ex-members who wish to attend should communicate with R. A. Baxter, Esq., of "Trevine," Southey Road, Worthing.

Batavia Survey

VICE-ADMIRAL L. A. C. DOORMAN has announced in Batavia that the R.A.F. will probably place a number of aircraft at the disposal of the Netherlands authorities for a survey of the interior of New Guinea.

Personnel for Rhodesian Air Wing

OF 1,200 passengers on the 20,000-ton transport *Orontes*, which called at Mombasa recently, 647 were R.A.F. personnel on their way to Heany and Thornhill, Rhodesia, as the first echelon of the permanent staff of the new Air Training Wing opening under the command of Air Commodore G. G. Banting.

Swordfish for National Maritime Museum

A FAIREY Swordfish is to be given to the National Maritime Museum, Greenwich to commemorate the air war at sea. It will find an honoured place among hundreds of relics which a Naval War Trophies Committee is obtaining for exhibition at Greenwich and four other National museums: The Imperial War Museum, Lambeth Road, S.E.; the Museum of the Royal United Service Institution, Whitehall; the Science Museum, South Kensington; and the Royal Scottish Museum.

No. 221 Squadron—Proposed Reunion

ALL ranks who served in No. 221 Squadron, R.A.F., and are interested in keeping old friendships alive, should write to Wing Cdr. T. R. Vickers, Old Mill Cottage, Rushden, Buntingford, Herts. If sufficient support is forthcoming, it is hoped to form an Old Comrades' Association and organize occasional reunion gatherings, the first to be held early in the new year, at a place most convenient to the majority.

Belgian R.A.F.V.R.—Transfer to New Air Force

A PARADE on the Evère landing ground, Brussels, on the afternoon of October 24th marked the transfer of the Belgian Section of the Royal Air Force Volunteer Reserve, which was disestablished on October 15th, to the newly recreated Belgian Air Force.

Among those present, or represented, at the ceremony and at the informal reception afterwards, were:—Grp. Capt. L. Leboutte, D.F.C., Headquarters, Belgian Air Force; Air Marshal Sir Philip Wigglesworth, K.B.E., C.B., D.S.C., Air Officer Commanding-in-Chief, B.A.F.O.; Air Marshal Sir Ralph Sorley, K.C.B., O.B.E., D.S.C., D.F.C., Air Officer Commanding-in-Chief, Technical Training Command; Air Vice-Marshal A. MacGregor, C.B.E., D.F.C., Air Officer in Charge of Administration, Headquarters, Fighter Command; Air Comdre. J. W. F. Merer, Director of Allied Air Co-operation and Foreign Liaison, Air Ministry; Air Comdre. W. E. Staton, D.S.O., M.C., D.F.C., Air Officer Commanding No. 46 (Transport) Group; Air Comdre. A. P. Ledger, C.B.E., Air Officer Commanding No. 28 (Training) Group.

Mr. Geoffrey de Freitas, Parliamentary Under Secretary of State for Air, wrote to Col. Raoul de Fraiteur, Belgian Minister of National Defence, expressing the Air Council's gratitude to the Belgian Section of the R.A.F.V.R. for their contribution towards winning the war.

"We shall always remember with admiration," he wrote, "the courage and skill with which they fought beside us in the defence of Britain after their own gallant country had been over-run, and their ever increasing effort which they sustained right through to the final liberation of Belgium and the defeat of our common enemy.

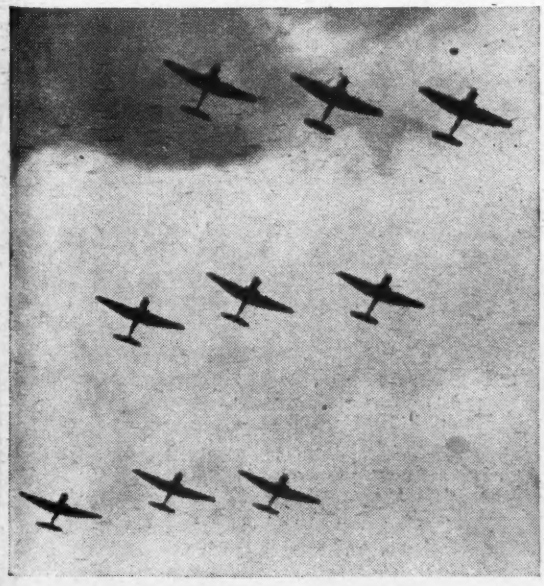
"May I personally wish the Belgian Air Force all success in their task of reconstruction and in the years ahead."

In another letter to Grp. Capt. Leboutte, the Chief of Air Staff, Marshal of the Royal Air Force Lord Tedder, G.C.B., placed on record his admiration and appreciation of the magnificent achievements of all the Belgian Officers and men who have served with the Royal Air Force in the Section.

"We in the Royal Air Force," he wrote, "will not forget that small and gallant band of Belgians who fought alongside us with such courage, determination and skill during the Battle of Britain. Later, as their numbers grew, and the Belgian Section trained its air and ground crews, they served with equal gallantry and distinction in Fighter, Bomber and Transport Commands, and in the Middle East, and played their part in the liberation of your country from our common enemy, and in his final overthrow. The award of three Distinguished Service Orders, and more than forty Distinguished Flying Crosses, and Distinguished Flying Medals to your air crews is a measure of their valour and worth. When the fighting ceased on V.E. Day, your air crews had destroyed one hundred and thirty-eight enemy aircraft. During 1942 and 1943 alone, as many as five Royal Air Force Squadrons were commanded by Belgian Officers.

"But the time has now come for Belgium to re-create her own Air Force. So,

BELGIAN STANDARD: Air Marshal Sir Ralph Sorley presents a standard to Colonel Boutten of the Belgian Air Force during a ceremony at Evère, reference to which is made on this page.



WARNING TO SHIPPING: Though having the appearance and dimensions of a fighter, the Blackburn Firebrand, a formation of which, flown by Naval pilots, is seen, is a torpedo and dive-bomber aircraft of great potency.

SERVICE AVIATION

though it is with deep regret that I say goodbye to the Belgian Section of the Royal Air Force Volunteer Reserve, I am confident that its courage, skill and experience will bring added strength to the Belgian Air Force. May the good comradeship and mutual understanding which grew up between the officers and men of our two countries, as they worked and fought side by side in the Royal Air Force during the war, continue between our two Services in the years ahead and be as potent a force for peace as it was for victory in war.

"I wish the Belgian Air Force good fortune and success in the years ahead."

In Grp. Capt. Leboutte's reply of thanks, he wrote:—

"I cannot tell you how touched I was to receive a personal letter from you, on this, in many ways, sad occasion. When I pass on your message to the officers and men of the Royal Air Force, Belgian Section, they will, I know, be equally sensitive of this personal gesture which you have made.

"We, for our part, will also never forget the warm welcome which the British Government, and especially the Royal Air Force, gave to the youth of the Belgian Air Force in 1940, and the continuous collaboration which you at all times extended to us. We all enjoyed serving in the Royal Air Force, fighting or working in other spheres, alongside the officers and men of the Royal Air Force. We were proud to wear the Royal Air Force uniform.

"Since the liberation of Belgium, and principally since the end of the war, we have had to confine our attention to the forming and equipping of a new Belgian Air Force, national and independent of the Royal Air Force; but during this time you have not only given us the benefit of your valuable counsel, the fruit of six long hard years of war, but also material help in kind and in personnel, for which we are also most grateful.

"In some respects this break from the Royal Air Force leaves a pain in our hearts, because sometimes one feels that terrible and agonizing as war may be, in the circle of progress it is almost worthwhile when it evokes the finest sentimental and emotional qualities in man, and forms friendships so deep and sincere which in a normal and humdrum life could never exist.

"We are reorganizing our Air Forces on the Royal Air Force model, and trying to put to good effect what we have learnt in the Royal Air Force. In this task, which is by no means finished, we know that we can count upon your support, and we look forward to a future period of association with the Royal Air Force, in circumstances different, but in the same spirit of goodwill and friendship of the war years.

"May I conclude in thanking you personally and the Royal Air Force for all you have done, and may I express the hope that one day in a not too distant future you will honour us with a personal visit. I am sure you know you will be more than welcome."

R.A.F. Education

TO interest R.A.F. officers in the objective study of international affairs, as presented by experts, the Royal Institute of International Affairs, at Chatham House, London, W, have organized a series of short courses for their benefit. One, on the Far East, opened on October 24th.

A principal aim of the Education Branch of the R.A.F. is to keep a fairly high level of authentic knowledge. "on tap" at R.A.F. Stations, and information gained by the 75 R.A.F. officers present at the course will be passed down to airmen through discussion groups and lectures. Previous courses have dealt with Europe, Middle East and Near East.

R.C.A.F. Survey

THE Royal Canadian Air Force has photographed more than 370,000 square miles of Northern Canada this summer, in pursuance of its 20-year-old job of mapping out the uncharted areas of the Northern country.

To the end of August air survey crews, operating from sub-arctic points, photographed 202,000 square miles by the large-scale vertical method and another 170,000 square miles by the tri-camera method.

The reasons for the photographic survey are several: the need for accurate maps of new areas for settlement, the location of regions rich in minerals which can be determined from geological "faults" in the terrain, and the need for information about areas requiring control of flood conditions or the prevention of soil erosion, are examples. Another is the need for better maps for National Defence.

R.A.F. Attend National Service of Seafarers

MEMBERS of the R.A.F., representing Coastal and Fighter Commands and the Air/Sea Rescue Service, attended the National Service of Seafarers at St. Paul's Cathedral on Wednesday, October 23rd. Air Vice-Marshal P. H. Mackworth, C.B.E., D.F.C., and Group Captain E. Douglas Jonés, represented the Air Officers Commanding-in-Chief, of Coastal and Fighter Commands respectively.

By last July the total of 16,305 rescues effected by the Air/Sea Rescue Service had been confirmed. These comprised:

Allied aircrew	11,363
Enemy aircrew	277
Mariners, etc.	4,665

No record of rescues effected before 1941 are available for the U.K., and overseas it was much later before official records were kept.

"York" Crash Near Calcutta

THE Air Ministry regrets to announce that when a York aircraft of R.A.F. Transport Command crashed shortly after taking off from Dum Dum, Calcutta, on October 20th, 1946, the following casualties to passengers occurred:

KILLED.

Group Capt. G. H. Foss, O.B.E.
Sqn. Ldr. the Rev. I.W.M. Taylor (Church of Scotland).
Sqn. Ldr. the Rev. A. J. Hepburn (Church of Scotland).

SERIOUSLY INJURED.

Wing Cdr. W. E. Hall, A.F.C.
Flt. Lt. R. A. Farley.

The next of kin have been informed.

Three passengers and four members of the crew were slightly injured, and four passengers and two members of the crew were uninjured. The next of kin of the slightly injured are being notified.

Penang Air Crash Casualties

THE Air Ministry regrets to announce that the following are missing, believed killed, as a result of the accident to the York aircraft of the R.A.F. Transport Command, which crashed into the sea north-west of Penang on October 6th, 1946:

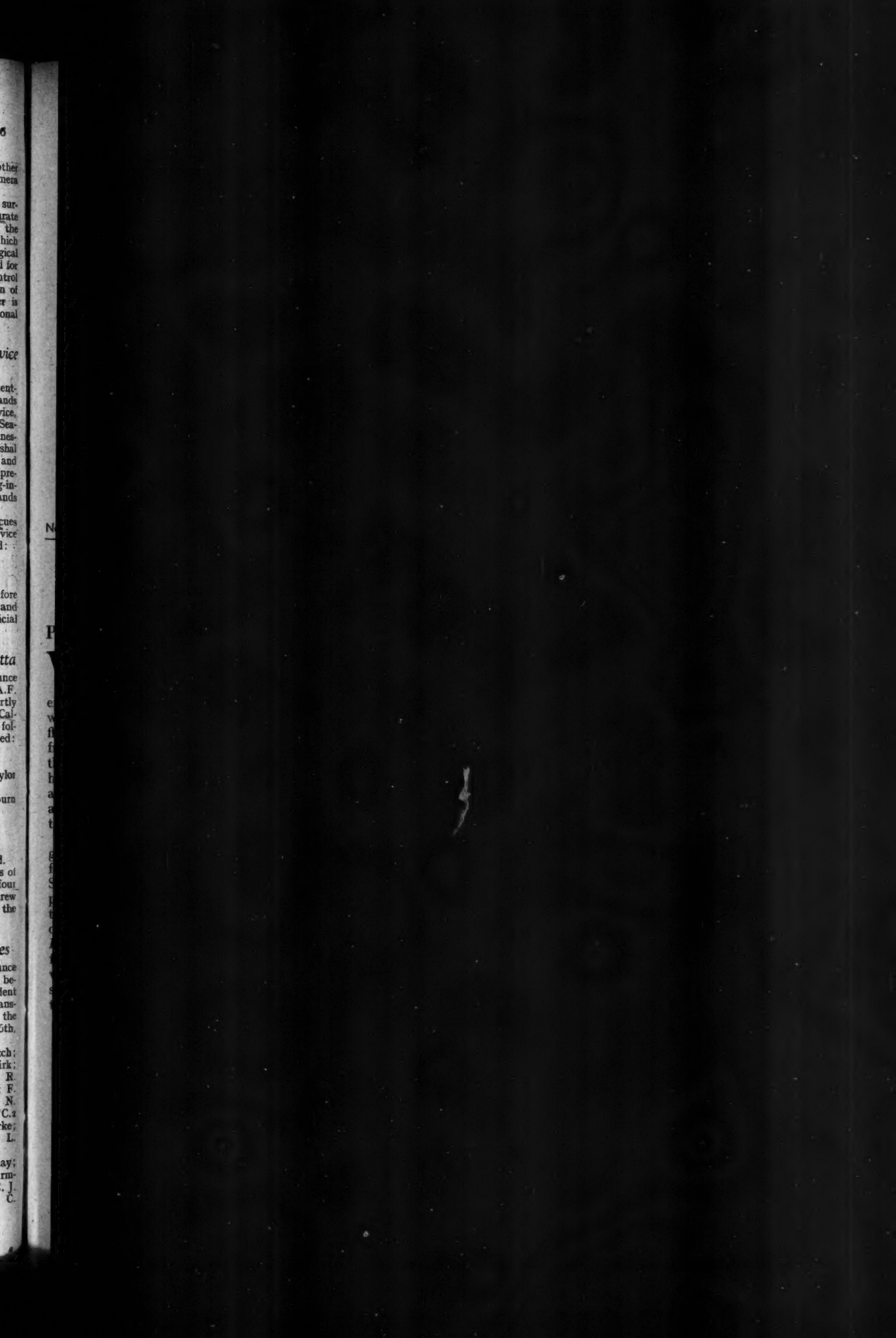
Passengers.—Flt. Sgt. J. J. Leitch; L.A/C. M. W. Davies; Cpl. R. Kirk; L.A/C. J. F. Lathan; L.A/C. G. R. Pritchard; L.A/C. T. Bone; A/C.1 F. Flood; Cpl. D. Cowell; L.A/C. F. N. Beckett; Cpl. R. L. Stilwell; A/C.2 G. A. Griffiths; A/C.1 R. C. Clarke; A/C.2 W. N. Westbury; Flt. Sgt. L. Kendrick.

Crew.—Flt. Sgt. D. H. Courtenay; P/O. D. J. Johns; F/O. W. W. Armstrong; W/O. L. Sawkins; Flt. Lt. C. J. McPherson, D.F.C.; T/Sgt. T. C. Murphy; W/O. R. Bowerman.

"208" Re-unites

BY what we are assured was a pure coincidence this year's reunion of No. 208 Squadron fell on the 30th anniversary of the squadron's formation. Accordingly, the cake, cut by Flt. Lt. B. Champneys, who was largely responsible for organizing the party, was a focal point in the Brettenham Restaurant last Saturday week where about 80 members of the squadron duly celebrated.

A signal was read from the present C.O. of the squadron (Sqn. Ldr. F. J. Roder) who reported its location as Aquir and its present equipment as Spit fire XVIIIs. He gave the average weekly flying time as 30-40 hours and mentioned that lectures are being given on jet propulsion.

Air Vice-Marshal J. Whitworth-Jones, C.B., C.B.E., who commanded 208 Squadron during 1933-34, spoke of its proud record and letters were received from Air Vice-Marshal Sir Geoffrey Bromet, K.B.E., C.B., D.S.O., the first C.O., and Air Vice-Marshal Sir John H. d'Albiac, K.B.E., C.B., D.S.O., the first adjutant. Air Comdre. W. A. D. Brook, C.B.E. — a "208" Squadron Leader in 1936-38—addressed the party, as did Sqn. Ldr. J. Aspden, Sqn. Ldr. G. Murray-Jones, Sqn. Ldr. Peter Bezencenet, D.F.C., Maj. Dave Edwards (who worked with the squadron as A.L.O.) and Mr. Kenneth Coleman.

The squadron has been informed that it is "top of the list" for honorary membership of the Desert Rats Club. This recognition is thoroughly deserved.